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ABSTRACT

This study investigated the impact of a student-tutor and parent interaction program on the achievement scores of ninth- and tenth-grade Algebra 1 and general biology classes. Past studies have shown that student-parent interaction in academic areas can produce significant increases in achievement scores. There is, however, very little evidence of this kind of involvement in secondary schools. Students enrolled in two algebra classes and two biology classes in each of two schools comprised the sample. Each teacher's two classes were randomly selected as control and experimental groups. Each teacher attempted to motivate pupils in the experimental group to interact with their parents on homework, while control group pupils were given no motivation to do this during the three-month study. No significant increases were found in the scores of experimental over control groups. However, insignificant increases of experimental groups over control groups were found for each of four separate investigations within subject and school.
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A QUASI-EXPERIMENTAL STUDY OF THE EFFECTS OF A STUDENT-TUTOR AND PARENT INTERACTION PROGRAM ON THE ACHIEVEMENT SCORES OF NINTH AND TENTH GRADE ALGEBRA I AND GENERAL BIOLOGY CLASSES

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A QUASI-EXPERIMENTAL STUDY OF THE EFFECTS OF A STUDENT-TUTOR AND PARENT INTERACTION PROGRAM ON THE ACHIEVEMENT SCORES OF NINTH AND TENTH GRADE ALGEBRA I AND GENERAL BIOLOGY CLASSES

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Purpose

This study investigated the impact of a student-tutor and parent interaction program on the achievement scores of ninth and tenth grade algebra 1 and general biology classes, and inquired if students at this school level were willing to initiate student-parent interaction. These are important areas to examine since past studies have shown that student-parent interaction in academic areas can produce significant increases in achievement scores. There is, however, very little evidence of this kind of involvement in secondary schools.

The sample used for the study consisted of students enrolled in four different classes of algebra 1 and four different classes of general biology. Two secondary schools were chosen. Each school contained four of the eight classes. At each school the four classes were two algebra 1 classes and two general biology classes. One instructor taught both algebra 1 groups. A different instructor taught both general biology classes. Each instructor's two classes were randomly selected as control

and experimental groups. Each teacher attempted to motivate students in the experimental group to interact with their parents on homework assignments. Tutor directions were given as an aid to creating successful parent interaction. Control group students were given no motivation to interact with parents.

The study lasted approximately three months.

Existing control and experimental groups were statistically compared in this quasi-experimental study. Each instructor's classes were compared separately. No statistical comparisons were made between classes taught by different teachers.

Statistical analysis of pretest and posttest achievement test scores showed no significant increases of experimental groups over control groups for any of the four separate investigations in this study, although insignificant increases of experimental groups over control groups were found for each of the four separate investigations.

Eighty of the ninety experimental group subjects agreed to participate in the study. However, only forty-six of these students actively interacted with their parents. Therefore 51.1 percent of the experimental students were able to initiate interaction with their parents. Thirty-four (37.8 percent) of the students agreeing to participate in the study did not successfully initiate interaction with their parents.

This study contains empirical data which may be of value to student-parent interaction program developers in secondary schools.

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CHAPTER I

INTRODUCTION, STATEMENT OF THE PROBLEM, HYPOTHESES, AND ORGANIZATION OF STUDY

Introduction

Research by organizations such as the National Assessment of Educational Progress (NAEP) has shown negative trends in education regarding high school achievement in academic courses such as science and mathematics. These studies indicate that students have not been properly motivated to learn effectively subject matter. What kinds of motivation techniques should be used by educators to produce significant increases in achievement scores in academic courses? Problems of this type must be solved or public school systems, as we know them, may be rendered less effective.

Maslow stated that psychologically healthy people have satisfied their needs for safety, love, and esteem. Once these needs are satisfied Maslow believes individuals are motivated,

> Primarily by trends to self-actualization (defined as ongoing actualization of potentials, capacities and talents, as fulfillment of mission [or call, fate, destiny, or vocation], as a fuller knowledge of, and acceptance of, the person's own intrinsic nature, as an unceasing

trend toward unity, integration or synergy within the person.[1]

Self-actualizing individuals are, thus, growth motivated. Self-actualization is not a static state of being. It is dynamic. People do not become self-actualized; they tend to become self-actualizing as their deficiency needs such as safety, love, and esteem are satisfied. Thus, according to Maslow, psychologically healthy people continue to achieve, rather than reach an achievement plateau, since they are or have become growth motivated.[2]

Using these assumptions, there may be an important need that high school students of today have not satisfied as effectively as high school students of a decade ago. This need to achieve in academic areas apparently may not be as strong as it was a decade ago.

Since, according to Maslow, achievement itself is a motivator, students may never fully reach this motivation level unless strategies are developed by educators to help high school students achieve in academic areas.

Herzberg presented an enlargement, refinement, and extension of Maslow's Theory. His theory states that there are two categories of needs for men. These needs are motivators and hygiene factors.[3] Motivators are considered to

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[1]Abraham H. Maslow, Toward a Psychology of Being (New York: D. Van Nostrand Company, 1962), p. 23.

[2]Robert S. Zais, Curriculum (New York: Thomas Y. Crowell Company, 1976), p. 221.

[3]Frederick Herzberg, Work and the Nature of Man (Cleveland: The World Publishing Company, 1966), p. 56.

be such processes as growing intellectually and achieving at one's job. Hygiene factors are rewards such as pleasant working conditions and other processes relating to the environment. Herzberg found that people whose needs are satisfied by hygiene factors tend to get little satisfaction from their work. It was also found that people who get satisfaction from their work are far less affected by hygiene factors. These people show a much greater involvement in organizational goals and tasks. They respond better to true motivational factors which foster psychological growth and self-actualization than they do to so-called hygiene factors.[4]

A study of 400,000 youth showed youth in the 1970s expecting greater intrinsic rewards than youth of the 1960s. This means that youth of today may be motivated more by meaningful work and other self-actualization motivators rather than by extrinsic hygiene factors.[5]

Herzberg states that the intrinsic factors of psychological growth and self-actualization are the true motivators. Since youth of today may be more intrinsically motivated than youth of over a decade ago achievement should be increasing rather than decreasing if educators are using true motivators rather than hygiene factors. It could be

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[4]Robert G. Owens, Organizational Behavior in Schools (Englewood Cliffs, New Jersey: Prentice Hall, Inc., 1970), pp. 32-33.

[5]Arthur H. Elliott, "Turning It Around in Education with Student Tutoring," The Clearing House 50 (March 1977): 285-290.

that students have moved from being motivated by extrinsic factors to intrinsic factors while the public schools are still using extrinsic motivational methods such as pleasant learning conditions and grades. It is possible that students are being made to adapt to the public schools rather than the schools adapting to the students. Public schools may be changing much more slowly than the clients being served. This means that schools may be using such hygiene motivational factors as security in the classroom and giving higher grades than are justified, rather than allowing children to do meaningful work in goal oriented classrooms. A more appropriate balance of extrinsic factors and intrinsic factors may produce better results. Appropriate subject matter is needed but may be of little use if students are not motivated to learn it effectively.

Since many studies have shown that allowing children to tutor has been a powerful student motivator of achievement this motivational element was used in the student-tutor and parent interaction program in this study. Some studies have shown that tutors learn more than tutees. Another powerful motivator of achievement, according to most available data, over the last decade, is student-parent interaction in academic areas. It may be that teachers and parents often assume the attitude that once a child enters school his education is the total responsibility of the school. Perhaps a system of education that continuously integrates

the efforts of the parents, as educators, in a training program offered by the school, is necessary.

Parents have great influence upon the behavior of their children, particularly their intellectual and academic achievement. This indicates that methods of initiating parent-child interaction need to be developed at this level. If students can be used to initiate academic interaction with their parents, resulting in significant increases in achievement scores, it could be a time saver to the parents and, perhaps, a money saver to the educators. Strategies for student-parent interaction have still not been clearly defined at the high school level. This also indicates that methods of initiating parent-child interaction need to be developed at this level.

The student-tutor and parent interaction model, used by the experimental groups in this study, was an attempt to use a strategy using student-parent interaction and tutoring as motivational elements to increase achievement scores significantly. Thus, the model was designed to adapt to the students' intrinsic needs, based on past studies and theory, rather than the students adapting to the model.

Statement of the Problem

This study investigates the effects of a student-tutor and parent interaction program on achievement scores of ninth and tenth grade algebra 1 and general biology classes.

The variables to be defined are: student-tutor and parent interaction program, achievement scores, ninth and

tenth grade general biology classes. Operational definitions for these four variables are:

1. The student-tutor and parent interaction program is a model. The interacting elements are the student-tutor and parents. The student-tutor receives tutoring instructions in his algebra 1 or general biology class. This strategy is designed to motivate the student to interact with his parents since the student is persuaded to practice explaining completed homework to the parent using correct tutor procedure. The student will, thus, initiate the student-parent interaction. A questionnaire will supply feedback to the teacher following each interaction. The student will take the questionnaire to and from the parent. Questionnaire responses supplement class discussions before the next test, thus, providing student-parent-teacher interaction. This model will be used for each major homework assignment.

2. Achievement scores are converted scores made by algebra 1 or general biology students on pretreatment and posttreatment standardized achievement tests by Educational Testing Services of Princeton, New Jersey. They are given to experimental and control groups for the respective discipline. Comparison of scores between experimental and control groups for each discipline will indicate effectiveness of the model.

3. Ninth and tenth grade algebra 1 classes are secondary students taking computationally-oriented nonterminal academic mathematics courses in multicultural schools.

4. Ninth and tenth grade general biology classes are secondary students taking vocabulary-oriented nonterminal academic science courses in multicultural schools.

The relationship investigated between the variables was cause-effect.

The purpose of the study was to determine if a student-tutor and parent interaction program (the cause) produced significant increases on achievement scores (the effect).

In using this model the student can receive instruction and can also learn how to initiate interaction during normal class time. This would be a time saver to the parent and would not involve expense to educators. The student as the interaction initiator would be responsible to the parent for understanding and explaining homework rather than the parent understanding and explaining subject matter to the student. This student-initiator method of getting parents involved with their children in academic areas would be simple to implement, inexpensive to operate, and may increase achievement scores significantly.

Hypotheses

Based on Maslow's Theory, Herzberg's Theory, and present motivational trends used in developing the student-tutor and parent interaction model, it was assumed:

1. Parents would effectively interact with their child in algebra 1 when the child was the interaction initiator.

2. Parents would effectively interact with their child in biology when the child was the interaction initiator.

Organization of Study

Chapter I has dealt with the introduction and statement of the problem. This chapter stresses a need for the development of motivation strategies to increase achievement scores of students in academic areas. Some studies have shown tutoring and parent involvement to be powerful motivators of achievement in academic areas. Thus, these motivational elements have been used in this study. The goal was to produce significant increases in achievement by using this interaction model.

Chapter II is the review of related literature which gives insight into eight important areas. These areas are interrelated and designed to increase one's knowledge of the present state of education in terms of student motivation and the importance of parent involvement toward increasing achievement scores. Suggestions, based on research, are made regarding shifting emphasis to situational parent involvement programs. Some studies have shown that properly implemented student-parent interaction programs will work. Many researchers feel that there is little need to prove the feasibility of parent involvement theory since they believe effective parent involvement automatically produces increases in achievement scores. If this is so, education now needs effective parent involvement programs and program engineers.

Chapter III, Methodology, indicates the basic structure of the design. This chapter describes the specific aim of

the study, statement of the research hypotheses, description of subjects, instruments, quasi-experimental design, procedure, statistical hypotheses, and limitations.

Chapter IV, Findings from the Statistical Analysis, explains how each instructor's control group and experimental group data was analyzed for significant differences.

Chapter V contains a summary of the study, conclusions, implications, recommendations to improve the study, and suggestions for further study.

The appendixes contain empirical data, forms, and explanations regarding factors in the study.

The bibliography is a compilation of complete and selective literature regarding topics related to this study.

CHAPTER II

REVIEW OF RELATED LITERATURE

This chapter gives insight into eight important areas that are related to the purpose of the study. The purpose of the study was to examine the effects of a student-tutor and parent interaction program on the achievement scores of ninth and tenth grade algebra 1 and general biology classes. The following information is designed to increase one's knowledge of the present state of education in terms of student motivation and the importance of parent involvement toward increasing achievement scores. This literature served as a guide in planning the study and may be of value to other student-parent interaction program developers.

Motivation Topics Related to Tutoring

Conflicting results are found regarding the effectiveness of tutor programs. One national survey of tutoring programs in higher education finds programs as effective for nondeficient academic students as for deficient students. Support for these programs will depend on their effectiveness in reaching the goals of providing effective academic work for those lacking an adequate background, and decreasing school attrition rates. Tutoring does increase achievement scores and lowers student attrition rate if implemented

correctly in the appropriate situation.[1] Hedges and Majer believe a specific program may work in one environment but be ineffective in a different environment.

A nationwide survey shows 73 percent of the nation's colleges maintaining tutor programs. Forty percent of the institutions canvassed had 80 to 100 percent of the tutoring costs paid by the college. This same survey shows over 35 percent of the colleges responding having no formal or informal evaluation. Tutorial programs must have methods of wise record-keeping, good planning, and overall organization.[2] College level tutor programs have lowered attrition rates producing tuition savings. This has created an awareness to administrators of the value of tutorial programs.

Results of a study at a college with an "open door" policy showed twenty-six students visiting a tutor of freshman mathematics making significantly higher ($p < .05$) final grades than twenty-six students of a control group not receiving tutoring. The statistical analysis was a one-tailed t test. Grades were interpreted as percent scores. The mean of the experimental group was almost 8 percent higher than the mean of the control group. Students

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[1]Larry V. Hedges and Kenneth Majer, A Longitudinal Comparative Study of a Process Oriented Tutorial Program (LaJolla, California: ERIC Document Reproduction Service, ED 126 835, 1976), pp. 6-7.

[2]Faye Curran, Accountability in Tutorial Programs (Miami University: ERIC Document Reproduction Service, ED 140 214, 1977), pp. 2-11.

profiting the most were in the average achievement range. Predicted low achievers profited least from tutoring or did not even take advantage of it.[3]

Crowder and Willis reviewed tutor programs in the United States. Their emphasis in research was using tutoring techniques to enhance achievement gains of tutors as well as tutees. They found information supporting the idea that every child should be given the opportunity to tutor as this is how children really learn how to learn. One five-month tutoring program reviewed by them showed average gains of six months in reading for tutees, while tutors made average gains of 3.4 years. Attempts to replicate previous successful tutoring programs were often unsuccessful in the areas of success of the programs being replicated. Some programs showed significant increases in tutor gains when compared to tutee gains while in replications there were no significant tutor gains. There may, however, have been significant gains for tutors compared to nontutors. A need for further research to provide definitive answers exists. Caution should be experienced when the virtues of tutoring experiences are described.[4]

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[3]James G. Troutman, The Effects of a Student Tutor Program Upon Learning in Freshman Mathematics (Nova University, ERIC Document Reproduction Service, ED 137 101, 1977), pp. 1-8.

[4]J. Crowder, and J. Willis, "Does Tutoring Enhance the Tutor's Academic Learning?" Psychology in the Schools 11 (January 1974):68-70.

The helping relationship has been the basis for many approaches to education in recent years. Peer tutors are used by educational institutions of all kinds. Cross-age tutoring with older tutors teaching younger tutees and "team" learning where students are paired for mutual help are used, depending on the specific situation. These techniques are innovative only within our modern age-graded schools. John Comenius, a Moravian educator, wrote a book in the seventeenth century called the Great Didactic in which he wrote "he who teaches others, teaches himself." Empirical studies of tutoring have been inconclusive and sometimes contradictory so those wishing to implement tutoring programs must often rely on accounts of others, based on their past experiences with tutor programs.[5]

Tutoring is effective if tutor-tutee interaction is centered around specific courses where the tutee is experiencing difficulty. Emphasis should be placed on developing overall study skills. The tendency is for tutoring to increase the tutee's final course grade rather than the tutee's grade point average. Problems dealing with the tutor-tutee interaction are not greater for any particular ethnic group.[6]

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[5]Roberta Wilkes, Peer and Cross-Age Tutoring and Related Topics: An Annotated Bibliography, Theoretical Paper, no. 53 (Madison, Wisconsin: ERIC Document Reproduction Service, ED 114 372, 1975), pp. 5-6.

[6]Jerry Snow and others, Tutorial Assistance Program, Evaluation (Austin, Texas: ERIC Document Reproduction Service, ED 133 641, 1975), pp. 16-30.

Fieldman found that fourth graders tutoring third graders were motivated by the evaluative powers they had been given. Tutors in this study cited the difficulty of teaching and the necessity of planning lessons. Tutors, however, agreed that they enjoyed being involved in the experiment. A significant increase in the tutees' mean scores on a reading comprehensive test was noted.[7]

Harris found that a sixth grade class of poor readers showed a high degree of responsibility and initiative in tutoring younger children. These same tutors showed very little responsibility and initiative toward solving their own reading problems. After six months of tutoring, students and teachers were working together in a positive way. The students' enthusiasm and interest had gone far beyond the teachers' expectations. Students were reading more than the seventy-five pages required per week. Their comprehension and ability to attack new words was increasing. Students were developing positive attitudes toward solving their own problems through helping other students solve their problems. Achievement test scores showed that some sixth grade tutors benefited academically much more than others. These were the children of average to high intelligence who were underachievers. Students scoring

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[7]Robert S. Feldman and others, Two Field Studies on Cross-Age Tutoring in the School, Technical Report, no. 361 (Madison, Wisconsin: ERIC Document Reproduction Service, ED 117 045, 1975), pp. 1-13.

less, however, developed a sense of dignity by helping the younger children. Probably, for the first time in their lives they were able to perceive success.[8]

A ten-week tutor program in reading showed significant tutor increases ($p < .01$) in the number of words read orally correctly. The mean number of words correct per minute on the pretest was 77.5. The mean correct on the posttest was ninety-two. The number of tutors used was six. Tutors were adolescents on probation whose reading levels ranged three to five years behind the age-grade expectancy level. Tutors were volunteers that trained for a period of three weeks immediately before the first week of tutoring. Three of the tutors were boys and three were girls. Their ages ranged between thirteen and sixteen years. They were tutoring children whose ages ranged from eight to ten years. Tutees were identified by their teachers as having reading levels at least two years behind the age-grade expectancy level.[9]

Peer tutoring guidelines developed in a study by Conrad were:

1. Achievement level in a particular class should not be used to keep a child from tutoring;

2. Tutor training in corrective feedback and basic reinforcement is necessary to have an effective peer tutoring program;

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[8]Mary M. Harris, "Learning By Tutoring Others," Today's Education 60 (February 1971):48-49.

[9]Marge Csapo, "If You Don't Know It, Teach It," The Clearing House 49 (April 1976):365-367.

3. Peer tutors teaching behavior may be less biased, regarding expectancies, than adult tutors.

Conrad indicated academic benefits for both tutor and tutee. Low achieving tutors had significantly low pretest and posttest scores. However, both male and female low achievers made significant gains from pretest to posttest. It is difficult to measure gains by high achieving tutors because of the ceiling effect.[10]

Using students as tutors places students in positions of increased responsibility and trust, inherent in the position, rather than requiring responsibility and trust before the position is acquired. Using student tutors creates a more goal oriented problem solving attitude on the part of the tutor.[11]

Student involvement in classwork can be increased if students are encouraged and allowed to tutor other students having difficulty. This effort can cut across all levels of achievement. It works well for good students as well as indifferent students. A student that understands something can tutor above, below, or at the tutors level. So-called poor high school students have done remarkable things with elementary pupils having difficulty in the lower grades.

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[10]Eva E. Conrad, The Effects of Tutor Achievement Level, Reinforcement Training, and Expectancy on Peer Tutoring (Tuscon, Arizona: ERIC Document Reproduction Service, ED 116 807, 1975), p. 9.

[11]Peggy Lippitt, Cross-Age Helping Programs and Suggested Designs Which Have Worked Well in Cross-Age Helping Programs (Washington, D.C.: ERIC Document Reproduction Service, ED 108 086, 1975), p. 3.

Youth have an inherent sense of nobility. We need to give students the opportunity to investigate their sense of nobility by allowing them to act as tutors.[12]

Melaragno believes experts have recently given more serious attention to tutoring by pupils because of the following two educational concerns: increasing number of older youths that are losing interest in the educational process, and lack of effective individualized instruction. Ten years of serious attention to pupil tutoring showed Melaragno that more systematic tutoring programs show greater cognitive growth, regarding the tutor, than less systematic programs. Although evidence for affective gains is less clear than academic achievement gains positive changes in attitude toward tutoring and other pupils has occurred.

Methods must be developed to interest school personnel in tutoring. Enlisting school personnel can make them more a part of the system and less apart from it. No energy needs to be expended in proving that tutoring works. Attention should now be devoted to the applications of tutoring.[13]

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[12]Kimball L. Howes, Large Schools: Can They Be Humanized Through Student Staff Relationships (Dallas: ERIC Document Reproduction Service, ED 127 708, 1973), p. 6.

[13]Ralph J. Melaragno, "Pupil Tutoring: Directions for the Future," The Elementary School Journal 77 (May 1977): 384-387.

The Classroom Environment

Educators recognize 10 to 40 percent of the average and above average students as failing to utilize their potential in school learning. These children are a source of confusion for their parents, their teachers, and even for themselves.[14]

Students with poor attitudes toward school often consider themselves to be at least average in academic ability. These students adopt certain attitudes if their self-esteem is threatened by school activities. By taking a negative attitude a student can protect one's self-esteem, maintaining that one is a good student by rationalizing that the reason for no achievement is not because of a lack of ability but because of a lack of being interested enough to try. This false type of self-concept hinders achievement. Negative school attitude serves as a protective function.[15]

Bogut found that attitudinal changes were produced in students who were initially open-minded. His final conclusion was that the degree of initial open-mindedness

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[14]Irene D. Hassett, A Preliminary Report on Community Collaboration: How it Enhanced Training of Professionals and Pre-Professionals, Involved Parents and Schools, and Expanded Services for Childrens' Psycho-Educational Needs (New Orleans: ERIC Document Reproduction Service, ED 115 368, 1974), p. 3.

[15]Lewis Paddy, Significant Others, Self Concept of Ability, and Achievement (San Francisco: ERIC Document Reproduction Service, ED 128 699, 1973), p. 7.

was the most important factor in producing attitudinal changes.[16]

Erez studied the idea that for goals to have an effect on performance effective feedback was needed. The subjects consisted of eighty-six undergraduate students enrolled in a psychology course at an institute of technology. Subjects were randomly divided into experimental and control groups. The task was number comparison requiring quick checking of discrepancies between two lists of numbers. It was a common clerical aptitude test. Since there were two stages to the experiment two similar forms were used, each in a different stage. Performance was determined by the number of correct answers. The experimental group received knowledge of their scores on the task at the end of the first stage. The two groups performed the second stage of the experiment. The groups did not differ significantly at the end of the first stage. ($\overline{X}$ for KS = 9.82, $\overline{X}$ for no KS = 10, t = .148, $p > .05$). After the second stage a high correlation (r = .60, $p < .01$) between self-goals and performance for the KS group was found to be significantly different from the correlation between the same variables in the no KS group (r = -.01, $p < .05$). It

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[16]Thomas L. Bogut, The Effects of Sequencing Selected Instructional Strategies on the Attitudes and Open-Mindedness of Pre-Service Elementary Science Teachers (Los Angeles: ERIC Document Reproduction Service, ED 108 899, 1975), p. 1.

was thus shown that knowledge of scores or feedback was a necessary condition for goals to effect performance.[17]

Hall conducted a study regarding the following three hypotheses:

1. Negroes may have lower academic aptitude;

2. Negroes may be less motivated;

3. Negro aspirations may not be genuine, but simply a way of winning the approval f the researcher.

The subjects were students enrolled at a junior college in Chicago who were taking a beginning social science course. The enrollment at the college was about 45 percent Negro and 45 percent White. From the original sample of 414 the following catagories of subjects were eliminated:

1. Female students, because achievement is more problematical for Negro men than for Negro women;

2. Students who were neither White nor American Negro (mainly Mexicans, Puerto Ricans, and Orientals);

3. Students who were age twenty-six or older, because older students returning to school have special problems;

4. One severely physically handicapped student;

5. Students with incomplete data records;

6. Students who had either been placed on academic probation at a four-year college, or dropped from a four-year college for poor scholarship.

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[17]Miriam Erez, Feedback: A Necessary Condition for the Goal-Setting-Performance Relationship (University of Maryland: ERIC Document Reproduction Service, ED 127 359, 1976), pp. 1-13.

7. Students whose family socioeconomic background was too high for them to be considered either lower or lower middle class.

After the above students were eliminated from the study the sample consisted of 159 subjects, ninety-three Whites and sixty-six Negroes. Regarding hypothesis one Negro students finished significantly lower on all four ACT scores (English, Math, Social Studies, and Natural Sciences). The statistical analysis used was analysis of variance ($p > .001$). Evaluation of hypothesis two used the following motivational variables:

1. Self Concept of Ability
2. Test of Anxiety
3. I-E Scores
4. Control Ideology and Personal Control Subscales

Need for achievement was measured by the Frech Test of Insight. Results from these tools showed that there was no significant racial difference on any of these scales. Of particular interest was the absence of a difference in Self Concept of Ability, in light of the significant racial differences in ACT scores and grades. The statistical analysis used to measure hypothesis two was analysis of variance on each of the motivational variables ($p > .01$). The third hypothesis was tested using the School Ambition Subscale Questionnaire. In summary no evidence indicated that Negro subjects were more influenced by the authority of the tester. Findings in this study support other common

research findings that there is a similar interest in education and aspiration level among Negro and White students. Such findings are not due to Negro students giving more socially desirable responses. The statistical analysis used for the third hypothesis was analysis of variance ($p > .05$). The only hypothesis which was supported was the first which blamed low Negro achievement on low ability.[18]

Dale interviewed eighty-four secondary teachers who had taught at least four years and had been recommended by either their principal, superintendent, or a supervisor. These teachers were asked to state the motivation methods that were most promising to them. Results of the interviews indicated that the most effective way to motivate students is for the teacher to demonstrate the following traits:

1. Is himself highly motivated
2. Is enthusiastic about his subject, students, and his teaching
3. Is businesslike and expects his students to achieve
4. Is always well prepared and his work is well organized
5. Knows his subject well and uses a variety of approaches to make it interesting to students

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[18]Eleanor R. Hall, Motivation and Achievement in Negro and White Students (Chicago University: ERIC Document Reproduction Service, ED 060 157, 1971), pp. 1-54.

6. Gives recognition to students who try hard and to students who do well

7. Tries to be fair, tolerant, and just with all students

8. Enjoys working with secondary school students

9. Is a friendly person but tries to get his students to work hard

10. Is a person who is patient with students

11. Is a teacher who explains things well[19]

Students create their own culture and way of life as a group as they undertake activity. Motivation is an important factor for an activity. The motivation source for activity is that each student has a stake in the expectations and standards that become established. Students care about the way of life that will be possible in the class. Students have strong psychological needs for being in the kind of classroom where they can survive. To some students algebra may mean less than nothing. It will be the self-esteem, freedoms, growing adequacy, and stimulation from rewarding activities that are important. When groups investigate things they must be arranged so students have the experience of creating a group that is dedicated to inquiry in the appropriate area of knowledge.[20]

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[19]Dale E. Davis, Motivating Secondary School Students (ERIC Document Reproduction Service, ED 137 263, 1977), pp. 1-12.

[20]Herbert A. Thelen, Education and the Human Quest (New York: Harper and Row, 1960), pp. 147-148.

Thelen said that there are at least two types of activities in all classrooms. One is the classroom group as a society. The second type of activity places the student in the role of "learner" and deals with the subject matter that is being taught. The student plays this role by working exercises, reading textbooks, taking notes, studying for tests, etc. In an activity-centered environment the rationale is that the student must participate in the activities in order to learn what is expected. This inquiry point of view is that students learn more effectively when their learning is aimed at a predetermined goal. If this condition exists the student will listen to relevant opinions from both the teacher and the other students and will not only act but will think about what he is doing. The student will get feedback from his own behavior and he can use this feedback to correct or plot next steps. This inquiry method is best suited for a heterogeneous group where the success of teaching depends more on the adequacy of the inquiry method than on the method used for selecting the children. The question of how effectively the class is inquiring is itself a legitimate question to ask and investigate. In developing methods where inquiry can be effective we are inquiring. This produces a merging of teaching and management functions within the one rationale of education.[21]

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[21]Herbert A. Thelen, Classroom Grouping for Teachability (New York: John Wiley and Sons, Inc., 1967), pp. 18-22.

Parental Influence

Nuttall studied the relationship between traits related to achievement and factors related to parent-child relationship. The subjects were 233 boys and 300 girls from different families in four suburban communities near Boston. The families involved were white, middle to upper class with either small or large numbers of children. Subjects were either attending junior or senior high schools. Parent-child relationships were measured using the child's perception since parents' perceptions are biased by such things as their desire to portray themselves in the most favorable way. Children are more candid. The child's perception of the parent-child interaction is the most important no matter how the parent treats the child. The parent-child relationship instrument used was the Childrens Reports of Parental Behavior Inventory (CRPBI). The Test of Effective Academic Motivation (TEAM) was used to measure traits related to achievement. For boys it was found that higher academic achievement related traits were demonstrated when their parents were low on hostile psychological control, high on acceptance, and firm in their discipline. For girls low hostile psychological control, and high on acceptance were the only parent-child relationships associated with higher academic achievement. Average correlations for the above were insignificantly different at the .05 probability level ($p > .05$). There was a tendency for the same sex parent to be more related

to the child, however, the differences in correlation averages were significant ($p < .05$).[22]

Parents who have high expectations for their children, regarding how far in school they want their children to go, have a positive effect on their childrens' attitude toward school. Parents who have low expectations for their children generally have children with negative attitudes toward school. Interestingly, however, whether a parent has high or low expectations does not effect achievement scores. Achievement scores for students with high and low expectations have not been found to be significantly affected by their parents attitude.[23]

Parents that are good readers and present a good model for their children tend to have children that are good readers. The home atmosphere of reading for enjoyment, continued education, expansion of the mind, new insights, change in attitude, and for fun seems to be catching and children living in this environment tend to develop these same attitudes. Parents of good reading children place a high value on social acceptance. Parents of poor reading children are more willing to participate in activities designed to increase their childrens' reading ability as

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[22]Ema V. Nuttall and Ronald L. Nuttal, Parent-Child Relationships and Effective Academic Motivation (San Francisco: ERIC Document Reproduction Services, ED 127 542, 1976), pp. 1-14.

[23]Albert B. Chalupsky and Gary J. Coles, Parental Educational Expectations and Their Impact on Student Outcomes (Palo Alto, California: ERIC Document Reproduction Service, ED 132 181, 1976), p. 30.

they seem to recognize a need for improvement. These parents are also poor readers and they view reading as primarily a skills process and do ot read for pleasure and enjoyment. Reading habits and attitudes of parents can indeed influence reading performance of their children.[24]

There is a low correlation between parent and child regarding leisure time activities. This low correlation is compounded in comparing leisure activities to social class differences. Differences can also be related to geographical regions as well as any of a thousand possible causes. It is important to take cognizance of the differences in leisure time activities produced by one's environment and to establish baselines regarding leisure attitudes before attempting to embark upon a change effort.[25]

Parents who abuse their children do not have a tendency to initiate contacts with family members. These parents accentuate the negative when they do interact with their children. They lack skills in the use of physical contacts. When physical contacts are attempted they are excessive and inappropriate. Parents who neglect their children have a pattern of behavior similar to parents who abuse their children. The awareness of parent abuse and

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[24]Margaret Dix, Are Reading Habits of Parents Related to Reading Performance of Their Children (Chicago: ERIC Document Reproduction Service, ED 133 693, 1976), pp. 5-6.

[25]John Neulinger, Within Family Leisure Attitude Similarities and Differences (Washington, D.C.: ERIC Document Reproduction Service, ED 136 174, 1974), p. 3.

neglect is essential in designing and implementing effective parent-child interaction programs. Such awareness can lead to attempts at prevention.[26]

It is normal to do homework when assigned. Children who deviate from the norm regarding homework assignments can change their behavior if a parent or other interested party establishes chains of positive cues rather than just a single cue. Nondeviant behavior is set off by a complex chain of events. Deviant behavior is cued much more quickly than nondeviant behavior.[27]

Parent Training

Fein discovered, with infants of less than three years old, that those families with extensive social networks both within the family and outside the home were more willing to receive educational messages. This shows that family life style determines to an extent how receptive people are to new information and to change.[28]

Brenninger and Ulmer demonstrated that parents can be of great help to their children without having to take the

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[26]Robert L. Burgess and Rand D. Conger, Family Interaction in Abusive Neglectful and Normal Families (Georgia: ERIC Document Reproduction Service, ED 141 984, 1977), pp. 15-16.

[27]Dennis H. Karpowitz, Predicting Deviancy in Family Interaction (Salt Lake City: ERIC Document Reproduction Service, ED 126 392, 1975), p. 5.

[28]Greta G. Fein, The Social Context of Mother-Infant Relations: A Study of Home Based Education (New York: ERIC Document Reproduction Service, ED 140 986, 1977), p. 11.

place of the teacher. This method involves the ability of the parents to distinguish between working and nonworking behaviors and also correct from incorrect work. Parents do not have to be able to teach their child how to get correct answers. This can be left for the child himself in practice sessions and if the child cannot figure out the correct answer the child should consult with the teacher. The parents main function is to concentrate on steady, correct working behaviors and to ignore nonworking and poor behaviors.[29]

An analysis was made in the inner city of Houston, Texas of why parents came to mathematics training sessions, their reactions to the sessions, and recommendations for future sessions. The pupil groups were identified as fifth graders. Five reasons parents attended these sessions were:

1. Curiosity
2. To be able to help their children
3. Someone they knew was also attending
4. To learn something that their children did not already know but would probably be learning
5. Closeness of the school to their home

It was found that the school that was near but not the closest received very little participation by outside

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[29]Louis P. Brenninger and Loretta I. Ulmer, School Homework as a Focus of Intervention Between Parents and Children (Los Angeles: ERIC Document Reproduction Service, ED 139 506, 1976), pp. 14-15.

parents. It was assumed that the reason for this was the large degree of parents, both husband and wife, working either during the evening or during the day. Personal attention was acknowledged by the parents. Parents enjoyed having someone to keep them abreast of local school actions. Participating parents also seemed to enjoy each other. Suggestions made by parents regarding future sessions for parents were:

1. Each session should be open to all parents
2. Inclusion of other subject areas
3. Sessions closer together

The conclusions regarding this study were that parents agreed that the treatment was not inappropriate and that they wanted more sessions.[30]

If parents are trained to tutor they will take a more active role in the education of their children. Attending occasional Advisory Council or PTA meetings are not the answer in getting parents effectively involved in their children's educational process. It is a monumental task to get parents involved in the school. Great strides are being made, however, but we still need parent involvement program developers. School districts across this nation are finally attempting to recruit and train parents to become involved but they don't know how to be of help.

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[30]Willis N. Johnson, Inner City Parents Attended Mathematics Classes--Why? (Houston, Texas: ERIC Document Reproduction Service, ED 141 123, 1977), pp. 2-8.

Children's attitudes towards learning are more positve when their parents are involved with their children's learning process.[31]

Parent-Student Involvement

Four basic conditions are necessary for effective citizen action regarding their involvement in the school program. These conditions are:

1. People must have a self interest,
2. People must understand the situation,
3. People must agree with the prescription by responding to the diagnosis,
4. People can enforce the prescription by having a sense of power.[32]

Sasfy studied the relationship between the perceptions by subjects of why subjects participated in a task to their perceptions of their causal attributions to task outcomes, motivation and attitude. The subjects were forty-eight male and forty-eight female undergraduates at a state university. Subjects were classified according to their following perceptions of task causality:

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[31]John A. McKinney, The Development and Implementation of a Tutorial Program for Parents to Improve the Reading and Mathematics Achievement of Their Children (Nova University: ERIC Document Reproduction Service, ED 113 703, 1975), pp. 8-9.

[32]Don Ed Davies, Schools Where Parents Make a Difference (Boston: ERIC Document Reproduction Service, ED 133 796, 1976), p. 151.

1. A choice condition in which extrinsic factors were minimized to create a perception of intrinsic motivation,

2. A social influence condition in which subjects perceive they are participating in order to please the experimenter,

3. An extrinsic reward condition in which subjects perceive they are participating in order to earn course credit.

The first condition related to internal control while the latter two conditions related to external control. The task was a bogus test that had been designed to produce considerable ambiguity concerning one's performance. The subjects were given directions regarding the nature of the task. At the completion of the task the subjects responses were scored and the subjects received feedback regarding their success or failure. Each subject was then asked questions regarding their success or failure outcomes. An example of a question was: "How successful would you be on a similar task in the future?" The analysis of results showed:

1. There was an indirect relationship between intrinsic motivation perception and extrinsic motivation perception as causes for task participation ($p < .01$).

2. Subjects motivated by the intrinsic or social factor showed less ego-bias in their causal attrition than extrinsically-motivated subjects.

3. Intrinsic motivation produces greater task motivation, enjoyment, and willingness to participate in a similar experiment.

Stated in everyday language Sasfy's findings showed that a person's perception of why he does something affects how he does it, how he feels about it, and what he thinks about it.[33]

The first major program for intervention with young children began in 1965. However, several experimental programs started several years earlier. We still know very little about the effects of intervention on the parents and children involved in these programs. Twenty-eight intervention programs were evaluated with emphasis on their effectiveness. Two elements were identified as having a high degree of impact on children. These elements were: the degree of structure used in the activities by the parents with their children and the degree of specificity used by teachers in working with parents. It was found that the more the teacher concentrated on the parent the greater was the achievement accomplished by the child. Each program of intervention must be developed in

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[33]Joseph H. Sasfy, Some Relationships Between Causality for Task Participation and the Causal Attribution of Task Outcomes (San Francisco: ERIC Document Reproduction Service, ED 124 813, 1975), pp. 1-4.

its own unique environment to measure its effectiveness on student achievement.[34]

Title 1, of the Elementary and Secondary Education Act of 1965, supports school programs in schools attended by significant numbers of students from low income families who may need help. Title 1, however, did not require school districts to involve parents of Title 1 students. By 1971 it was proven that parent involvement of Title 1 students increased the effectiveness of the Title 1 program. The Commissioner of Education ordered each school system with a Title 1 program to develop an advisory council with Title 1 parents on it. The effective date of this order was 1971. The Parent Advisory Council (PAC) must have meaningful input into the planning, operation, and evaluation of the Title 1 program, even though they function as an advisory group. The Buckley Amendment, or Family Educational Rights and Privacy Act, named after Senator James L. Buckley of New York, who originally sponsored this legislation, became law in 1974. This Amendment bars the use of Federal funds by any school system permitting the release of educational records or personal information regarding students without parents permission. This Amendment also makes it necessary for a majority of Title 1 PAC members to be parents of Title 1

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[34]Robert D. Hess, Effectiveness of Home-Based Early Education Programs (Washington, D.C.: ERIC Document Reproduction Service, ED 133 048, 1976), pp. 2-12.

students. In advertising for PAC members no personal educational information may be given. A student must live within the attendance area of a school offering a Title 1 program. PAC member solicitation may not be identified by using advertisements since students must be functioning at a below grade performance level. Thus, a list of students who qualify may not be used to advertise for potential PAC members since this list would automatically identify the students peformance levels. These are some of the problems involved with this program and may be the reason more school systems don't obtain or try to obtain Title 1 money. Until clear rules, regarding release of information, are released by OE local school districts should proceed cautiously.[35]

Research shows that 99 percent of the high school parents who become involved in the guidance of their children by visiting the school and being visited by counselors in the home feel that their children are achieving at an average or above average level. Thirty-six percent of this majority, however, feel that their children are not achieving up to their potential. Involved parents have assessed student achievement as

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[35]Lawyers' Committee for Civil Rights Under Law, New Legal Requirements for Parent Involvement in Title 1 Projects (Washington, D.C.: ERIC Document Reproduction Service, ED 128 477, 1975), pp. 2-4.

reasonably high but still feel as though their children are underachieving.[36]

Parent-Teacher Involvement

Parent and teacher involvement is not a new concern in education. Even though this involvement has mushroomed since the beginning of the Head Start program, over a decade ago, it has been recognized as a concern as early as 1891 by American Educators. It has only been recently, however, that teachers and parents have earnestly been seeking methods to implement successful parent and teacher involvement programs. Programs aimed at either early or middle childhood can produce enduring change in child development only if there is appreciable change in the people associated with the child on a continual basis. The parent and teacher must realize that their approaches to child development can be different and that cooperation is essential. Each must explore their own self concept and personalities in such a way as to develop acceptance and trust between each other.[37]

The results of a specific parent-child-teacher interaction program could depend on the attitudes of the

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[36]Ken Lamont and Naomi Rice, Guidance Awareness Program: Narrowing the Gap Between Home and School (Oregon: ERIC Document Reproduction Service, ED 126 272, 1975), p. 64.

[37]Steven B. Silvern and Thomas Daniels Yawkey, Parent and Teacher Strategies for Working Together (Salt Lake City: ERIC Document Reproduction Service, ED 124 293, 1976), pp. 3-9.

parent and the child regarding their stance as shown below:

1. I'm OK, You're OK, They're OK (Democratic)
2. I'm OK, You're OK, They're Not OK (Demogogue)
3. I'm OK, You're Not OK, They're OK (Malcontent)
4. I'm OK, You're Not OK, They're Not OK (Self-Righteous Critic)
5. I'm Not OK, You're OK, They're OK (Melancholy)
6. I'm Not OK, You're OK, They're Not OK (Servility)
7. I'm Not OK, You're Not OK, They're OK (Servile Envy)
8. I'm Not OK, You're Not OK, They're Not OK (Cynical)

The first attitude is desirable. The more parents and students that fall into this category the greater expectancy of interaction program effectiveness. Since the school, or specifically the classroom teacher, may be the initiator of an interaction program it can be assumed that there would be little cooperation on the part of the parent or student if their stance on the third party were "They're not OK." If a third party stance is "They're OK" the program should work as the remaining two variables may change, if not already desirable, as the program develops.[38]

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[38]Joseph Lapides, Helping Parents to Help Children (Chicago: ERIC Document Reproduction Service, ED 125 186, 1976), pp. 6-9.

Parents should think of themselves as a part of a team with their child's teacher. Being successful in reinforcing a child's classroom learning by continuing the teaching process at home involves the parents' awareness of desirable teaching behaviors. These desirable teaching behaviors are methods of teaching providing for clear communication between teacher and learner. A learning activity taken into the home can be successful if the parent understands the desirable teaching behaviors necessary to promote success. One method of ensuring this is to keep a parent-teacher planning session checklist.[39]

Principals and teachers are the two key sets of practitioners in schools. Education drastically needs a coalition between parents and key school practitioners. School reforms, such as stressing more parent involvement. have often widened the gulf between practitioners and parents. Classroom practitioners resist top-down general staff patterns of reform as well as grass roots citizen reform because such reforms to the classroom practitioner resemble the educational equivalent of a lynch mob. These methods are self-defeating because of the lack of a workable coalition between parents and school practitioners. The more educational associations and educational unions think in terms of alliances with parents and school practitioners the more promising the future will be for

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[39]Mary Jordan, Desirable Teaching Behaviors--Tasks and Task Planning (Florida: ERIC Document Reproduction Service, ED 141 361, 1977), pp. 4-5.

students regarding the development of their potential. The classrooms and schools are the ultimate tools for change. If there is to be an end to traditional adversary relationships between parents and practitioners it will most likely take place at this level. This level, however, however, is the most difficult level to reach in ways that help.[40]

The Rationale for Parent Involvement Programs

The federally funded National Assessment of Educational Progress (NAEP), directed by the Education Commission of the Unite States, pinpointed weaknesses in mathematics and science programs. The results of two studies conducted by the NAEP based on the estimated 3.5 million school-age students represented by the groups tested showed:

1. American young people knew less about science in 1975 than children of the same age knew in 1969 to 1970. For example, approximately eighty thousand fewer seventeen-year-olds could answer a question based on the knowledge of devices used in electric power transmissions.

2. Although 60 percent of the nation's seventeen-year-olds can perform addition, subtraction, multiplication, and division, only 35 percent can solve a simple multiplication

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[40]Don Ed Davies, Schools Where Parents Make a Difference, pp. 17-19.

problems with decimals. Such negative trends in education can no longer be ignored or the public school systems, as we know them, may be destroyed.[41]

Today's youth may expect greater intrinsic rewards than youth of the past. A comparison of a 1960 survey of 400,000 high school students with a 1970 survey of a representative sample showed a marked shift in values. The shift was from student valuing job security and opportunity for promotion in 1960 to freedom to make decisions and to do meaningful work in 1970. This trend shows a shifting from placing greater values on extrinsic rewards in 1960 to greater values on intrinsic rewards in 1970.[42]

Motivation, home background, and classroom stimulus have been virtually unexplored in meaningful quantitative parametric ways. Ten times more study has been given to predictions from intelligence and other cognitive capacities regarding effects on school achievement. One major reason for this is that measurement of such things as motivation and personality have only become sufficiently

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[41]Arthur H. Elliott, "Turning It Around in Education With Student Tutoring," The Clearing House 50 (March 1977): 285-290.

[42]Paul D. Krivonis, The Relationship of Intrinsic-Extrinsic Motivation and Communication Climate in Organizations (San Francisco: ERIC Document Reproduction Service, ED 131 512, 1976), p. 6.

organized, within the last decade, to be effectively applied in measuring their effect on achievement scores.[43]

Methods of Getting Parents Involved

Smith and Waltz have identified certain guidelines in the implementation of programs in psychological education. They are:

1. Identify the purpose,
2. Identify the kind of support obtained in the specific setting,
3. Identify the resources,
4. Identify the best method to piece together the resources, and
5. Identify methods of evaluation so it can be determined if the purpose was accomplished.

The above five guidelines call for the identification of goals followed by the determination of support by the administration, teachers, parents, community, and students. The resources to be utilized should be accurately determined. Resources such as textbook materials, students, parents, teachers, and administration must be identified. These resources must then be pieced together in the best possible way to develop initial interest by students (subjects). Effective piecing must first motivate subjects to get involved and second, once they're motivated,

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[43] Raymond B. Cattrell and others, Effects of Personality, Motivation, and Reward on Learning (Champaign, Illinois: ERIC Document Reproduction Service, ED 095 448, 1974), p. 1.

maintain that initial motivation. When all of the above have been accurately determined methods of measuring outcomes must be identified to determine if the purpose was accomplished.[44]

Parents can become more concerned and involved in school programs if personal contact and frequent communication are made through letters, notes, and accomplishment certificates which can be given to the pupils.[45]

Fedoravicius developed a paradigm because he was unsuccessful in getting the parents involved in modifying their adolescent son's behavior. The researcher used the son to change the parents reaction to the son's behavior. Reports from the son showed that there was a gradual increase in positive interactions with his parents.[46]

Today's parents have been educated to leave education alone, as educating children is for the experts. Educators know from past studies that parents who believe this are misinformed. Now it is up to the educators to reeducate parents towards a realization of the positive aspects of parent involvement, since such involvement can

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[44]Robert L. Smith and Garry R. Waltz, Developing Students Potentials (Ann Arbor, Michigan: ERIC Document Reproduction Service, ED 083 532, 1973), pp. 86-87.

[45]Buddy-Tutor Project, Hilo Intermediate School (Honolulu: ERIC Document Reproduction Service, ED 126 208, 1974), p. 11.

[46]James M. Kauffman, Charles S. McGee, and Judith L. Nussen, "Children As Therapeutic Change Agents: Reinforcement Intervention Paradigms," Review of Educational Research 47 (Summer 1977):458.

substantially influence the child's attitude toward school. and achievement. The reason most parents do not participate is that they are not sure that particpation makes a difference. Parent involvement needs to be directed towards skills. Educators should be interested in devising possible methods of getting participants involved. These methods should not necessarily be one of the time consuming traditional meetings, which to parents are often a bore and organized to smooth over problems and not to get the parents involved.[47]

Conclusions from available data over the last decade are in support of the involvement of parents with their children. This concept when investigated has produced significant immediate gains in IQ scores and school performance. Defining strategies for this kind of intervention, however, are still not clearly defined. There is a weak relationship between intervention programs and children outcomes. Methods of initiating the parent-child interaction need to be developed. Data indicates that parents are interested in intervening when such interaction is centered on mastering basic skill objectives. It possibly could produce significant achievement gains as long as the approach is concentrated at home around academically centered activities.[48]

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[47]Ethyl Lichtman, Educating Parents About Education: A Review of Some Issues, Methods and Sources of Information (Washington D.C.: ERIC Document Reproduction Service, ED 129 710, 1974), p. 36.

[48]Beverly Mattox and Dorothy Rich, "Community Involvement Activities: Research into Action," Theory into Practice 16 (February 1977):29-30.

Summary

Studies have shown that parent-involvement can produce significant increases in student achievement. It may be that parents have been educated to leave education alone. If so, it now remains for the key practitioners in our educational institutions to develop methods of getting the parents to think of themselves as a part of a team. This team could form a coalition between the educators and the parents. Reaching out methods designed to involve parents must be developed. Emphasis should now be on development of methods rather than the past emphasis on proving that parent involvement increases student achievement. Subject matter is important but what good is it if students are not motivated. Allowing children to tutor after taking tutor instruction has been a very successful motivator. Studies show that tutors often learn more than tutees. Teamwork between parents, students, and teachers has been shown to be a successful motivator with academic courses. Most studies show that emphasis must be placed in academic areas. An awareness, by program developers, of a child's need to explain things should be considered in developing involvement programs. Student-parent interaction programs can possibly be developed using the students as interaction initiators.

CHAPTER III

METHODOLOGY

Specific Aim of the Study

The specific aim of this study was to answer the following question: What effect does a student-tutor and parent interaction program have on the achievement scores of ninth and tenth grade algebra 1 and general biology classes?

Statement of the Research Hypotheses

Studies have shown that parent-student interaction in academic courses may produce significant student increases on achievement test scores. However, research shows little evidence of student-parent interaction in academic courses in secondary schools. Instructors in the secondary schools need to develop effective outreach methods to get parents involved with their children in academic areas. Programs using parents as tutors of their children have required large amounts of parent time and sometimes large amounts of money. Therefore, a program which allows the student to initiate the interaction with his parents seems useful. Such a program would consist of simple and inexpensive interaction methods that would meet with less internal and external

resistance. The student may receive instruction and also learn how to initiate interaction during normal class time. This would be a time saver to the parent and would not involve expense to educators. The student as the interaction initiator would be responsible to the parent for understanding and explaining homework rather than the parent understanding and explaining subject matter to the student. This student-initiator method of getting parents involved with their children in academic areas would be simple to implement, inexpensive to operate, and may increase achievement scores significantly. Therefore, it was hypothesized:

1. Parents will effectively interact with their child in algebra 1 when the child is the interaction initiator.

2. Parents will effectively interact with their child in biology when the child is the interaction initiator.

Description of Subjects

Sample groups for this study were selected from two specific secondary schools. The average membership of each secondary school was approximately nine hundred students. These two secondary schools were feeder schools to the one senior high school in this school district. The senior high school had a membership of approximately seventeen hundred eleventh and twelfth grade students.

This city school district had a total student membership of about twelve thousand students and was multicultural. Approximately 47 percent of the students were black. White students numbered about 44 percent with the remaining nine percent being represented by several other ethnic groups. The west side of the city was largely populated with white families. Black families and other minorities were concentrated largely in the east side of the city. The city bused students, thus providing for proportional ethnic distribution in almost all schools.

To be enrolled in algebra 1 a student was recommended by his last mathematics teacher. To be enrolled in general biology a student was average in the fundamentals of reading and mathematics. Some students were above average. Neither algebra 1 or general biology were terminal courses. In either algebra 1 or general biology, however, almost any student could have been admitted if admittance were demanded. This demand for admittance was the exception to the rule. It did not often occur.

Instruments

Biology subjects were pretested and posttested. The tests used were the Cooperative Biology Achievement Test of Educational Testing Service (ETS) of Princeton, New Jersey. Algebra 1 subjects were also pretested and posttested. The test used was the Cooperative Algebra 1

Achievement Test by ETS. Alternate forms were used for both algebra and biology.

Alternate forms of algebra 1 and biology tests were equated in order to adjust for differences in item difficulty and discrimination. These differences inevitably exist because of the impossibility of obtaining a perfect match between the sets of items which comprise alternate forms.

The Cooperative Algebra I and Biology tests were measures of developed abilities, and thus their content validity was of primary importance. The researcher compared test questions with course textbook objectives. The high positive relationship of test content to teaching objectives was the reason the ETS Cooperative Tests were chosen for both algebra 1 and general biology. The statistical analysis of the data showed significant increases ($p < .0000$) from pretest to posttest for all control and experimental groups in this study. This indicated that the achievement tests were accurate indicators of the amount learned from pretest to posttest.

The reliabilities reported for the Cooperative A Algebra I and General Biology Tests were measures of internal consistency, computed using the Kuder-Richardson Formula 20. The reliability for the Cooperative Algebra I Test was .85 for both Forms A and B. The standard error

of measurement was 3.72 for both Forms A and B.[1] The reliability for the Cooperative Biology Test was .92 for both Forms A and B. The standard error of measurement was 2.94 for Form A and 2.79 for Form B.[2] The reliabilities reported were for groups selected from many schools and, as such, were overestimates of the reliability to be obtained for a more homogeneous group within a single school.

Quasi-Experimental Design

A schedule of activities for this study was used by the researcher (Appendix A).

Two first-year algebra classes taught by Instructor A were selected from Secondary School X. This same procedure was used for Instructor B at Secondary School Y. Instructors A and C were located at the same secondary school (X). Instructors B and D were located at the same secondary school (Y). The two classes taught by each instructor were randomly, by the flip of a coin by the researcher, chosen as experimental and control groups. Students ... the eight existing groups were not randomly selected as area school policy did not allow this type

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[1]Educational Testing Service, Cooperative Mathematics Tests Handbook (Princeton, New Jersey: Educational Testing Service, 1964), pp. 62-63.

[2]Educational Testing Service, Cooperative Science Tests Handbook (Princeton, New Jersey: Educational Testing Service, 1964), pp. 62-63.

of grouping. Each class contained from eleven to twenty-eight students who took part in this study.

TABLE 1.

SUMMARY OF THE DESIGN

Instructor	Subject	Group	School Period	School
A	Algebra 1	Con	2	X
A	Algebra 1	Exp	1	X
B	Algebra 1	Con	6	Y
B	Algebra 1	Exp	4	Y
C	Biology	Con	6	X
C	Biology	Exp	5	X
D	Biology	Con	3	Y
D	Biology	Exp	1	Y

The researcher administered the appropriate pretests to control and experimental groups. Experimental groups were given the treatment following the pretest. The treatment was applied for approximately three months. At the end of the three-month period the researcher administered the appropriate posttests to control and experimental groups. During the study, experimental group students were classified into three categories:

1. Active Participants--students consistently interacting with their parent or parents;

2. Participants--students taking the pretest and posttest but not consistently interacting with their parents;

3. Nonparticipants--students not agreeing to participate in this study.

Pretest and posttest results for each instructors control and experimental groups were statistically compared. Only active participant and participant experimental group scores were used in the statistical analysis. Control group scores, used in the statistical analysis, were from students taking both the pretest and posttest.

The Three Factor Analysis of Variance with Repeated Measures on The Third Factor was the statistical method used. It determined if there were significant differences between control and experimental groups at the .05 probability level.

No statistical comparisons were made between groups taught by different instructors. Thus, each instructor's control and experimental groups were compared separately.

Procedure

The subjects in the treatment groups were assigned homework. Students were given a deadline to complete the homework assignment. The teacher may have elected to grade the homework and have student-teacher interaction. The instructor may have preferred to have student-teacher interaction and allow the student to correct their own homework. Following student-teacher interaction tutor instructions were given to the class. The teacher stressed the point that to be good tutors, people must be

knowledgeable in what they are tutoring. Each student participating in the program received a tutor direction sheet (Appendix D). The teacher pointed out to the students that they would be learning how to become tutors. Approximately half of one class period was allocated for these tutor lessons. These lessons came immediately before the students took their completed homework to their parents for interaction. Students were encouraged to practice tutoring on their parents. Tutor lessons, however, were being offered as a student motivational device. The learning of subject matter was, thus, goal oriented. Students were given a questionnaire during this same half-hour (Appendix G). Pupils were told to give the questionnaire to their parents. They were also instructed to initiate interaction with their parents by explaining the homework assignment to them (Appendix D). Students were again reminded to practice tutoring in their presentation to the parents. Upon completion of the student-parent interaction the parents who were actively participating responded and signed the questionnaires. The questionnaires contained questions regarding the parents' perceptions of their childs' demonstrated weaknesses and obvious strengths on the homework assignment. This questionnaire was given to the teacher by the student. It was designed to supply the teacher with valuable feedback. This procedure was followed for each major homework assignment. Certificates were given to all active

participant experimental group students at the end of the three-month study. At the end of the study questionnaires were given to active participant students and parents, and instructors for their responses (Appendix G).

The control group subjects received the same instruction at school. They were not, however, required to have student-parent interaction and tutor instructions. These subjects were not persuaded to act as interaction initiators to their parents.

Statistical Hypotheses

The null hypotheses were used to test for differences in achievement between the experimental and control groups. The hypotheses were:

Hypothesis 1--There will be no significant difference in the pretest-posttest achievement test scores between the classes who act as interaction initiators to their parents in algebra 1 and general biology, and those who do not.

Hypothesis 2--There will be no significant difference on pretest-posttest achievement test scores between experimental and control groups and the sex of the student.

Limitations

Random sampling of subjects was not possible in this school district, so existing control and experimental groups may have been significantly different.

Familiarization with pretest questions could have influenced results of the posttest. This possible source of contamination was minimized because of the use of alternate forms.

The achievement test may not have been an accurate measure of achievement due to teacher priorities regarding subject matter.

Instructor effectiveness and efficiency could have varied. This could have made a difference in pretest-posttest gains when comparing the output of Instructors A, B, C, and D.

Each teacher's ability and willingness to follow directions and use the procedure, as explained and outlined on the teacher direction sheet (Appendix C), may have varied.

Interaction between experimental and control groups at the same school could have effected results.

The Hawthorne Effect may have caused experimental classes to accomplish more than control classes. This external factor was minimized because of the use of existing groups.

Attrition rates for control and experimental groups could have effected results (Appendix F).

This chapter explained the basic structure of the design. It described the specific aim of the study, statement of the research hypotheses, description of subjects, instruments, quasi-experimental design, procedure, statistical hypotheses, and limitations.

CHAPTER IV

FINDINGS FROM THE STATISTICAL ANALYSES

This chapter shows how the student-tutor and parent interaction program was analyzed for effectiveness. It indicated how control and experimental groups were compared in determining if significant differences existed between them. This chapter also contains summary tables and figures of data collected during the study.

The data collected during this experiment were analyzed in two parts in comparing each instructor's control and experimental groups. First, the pretest-posttest mean scores of each instructor's control and experimental groups were statistically compared. The Analysis of Variance Three Factor Design with Repeated Measures on One factor was used for this analysis. This design does not require group subjects to be equal across cells.[1] This 2 x 2 x 2 ANOVA is outlined in Table 2, page 56.

Second, the pretest-posttest mean scores of males and females in each instructor's control and experimental groups were statistically compared by using the same Three Factor Analysis.

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[1] Peabody Statistical Library Manual (Nashville, Tennessee: George Peabody College for Teachers, 1976), pp. 6.3.1.-6.3.4.

TABLE 2

SUMMARY OF ANOVA DESIGN

Factors	Levels
A	A_1 Control Group A_2 Experimental Group
B	B_1 Male B_2 Female
C (Repeated Measures)	C_1 Pretest C_2 Posttest

All calculations for the Three Factor Analysis of Variance were performed by the computer programs available in the statistical library at the George Peabody College Computer Center in Nashville, Tennessee. The data collected during this experiment and used in these analyses are presented in Appendix F.

Analysis of Instructor A's groups are presented first, followed by the analysis of the groups taught by Instructors B, C, and D.

Instructor A

Analysis of Hypothesis of No Significant Difference in Pretest-Posttest Achievement Test Scores Between Control and Experimental Groups

The measure of control and experimental group achievement in algebra 1 was the increase on the mean pretest-posttest

scores on the Algebra I Tests of the Cooperative Mathematics Test Programs. Form A was given as the pretest. Form B was given as the posttest. The cell means, standard deviations, and frequencies for these achievement scores are shown in Table 3.

TABLE 3

MEANS, STANDARD DEVIATIONS, AND FREQUENCIES FOR ACHIEVEMENT

Treatments		Levels	
		Pretest (C_1)	Posttest (C_2)
Group Con (A_1)	Means	138.94	150.67
	Standard Deviation	10.14	10.04
	Frequencies	21	21
Group Exp (A_2)	Means	140.30	154.80
	Standard Deviation	7.43	11.07
	Frequencies	20	20

Table 4, page 58 is an Analysis of Variance Summary Table obtained from the data using the Three Factor Analysis of Variance with Repeated Measures on the C Factor Program at the George Peabody College Computer Center.

This summary table indicates no significant difference between control and experimental groups on pretest-posttest mean scores at the .05 probability level. Therefore, the

hypothesis of no significant difference in the pretest-posttest achievement test scores between control and experimental groups, Hypothesis 1, was retained.

TABLE 4

ANOVA SUMMARY TABLE

Source	SS	df	MS	F	p
Total	7328.24	81			
Between	3087.74	40	77.19		
A (Male Control Group)	152.76	1	152.76	1.980	N.S.
B (Female Control Group)	76.68	1	76.68	0.994	N.S.
A X B	4.01	1	4.01	0.052	N.S.
Error (Between)	2854.29	37	77.14		
Within Subjects	4240.50	41			
C (Male Exp. Group)	3486.45	1	3486.45	183.988	0.0000
A X C	39.12	1	39.12	2.065	N.S.
B X C	11.24	1	11.24	0.593	N.S.
A X B X C	2.56	1	2.56	0.135	N.S.
Error (Within)	701.12	37			

Analysis of Hypothesis of No Significant Interaction Between Control and Experimental Groups and the Sex of the Student

The measure of male and female achievement in control and experimental groups was a measure of their mean

pretest-posttest scores on the Algebra I Cooperative Tests.

The ANOVA summary from Table 4 indicates no significant interaction on the pretest-posttest between the sex of the individual, and the experimental and control groups. Therefore, Hypothesis 2, the hypothesis of no significant difference between control and experimental groups, and the sex of the child, was retained.

The means, standard deviations and frequencies for males and females on the pretest algebra 1 achievement scores are shown in Table 5.

TABLE 5

MEANS, STANDARD DEVIATIONS, AND FREQUENCIES ON ALGEBRA I PRETEST SCORES FOR MALES AND FEMALES

Treatments		Levels	
		Males (B_1)	Females (B_2)
Group Con (A_1)	Means	137.56	140.33
	Standard Deviation	7.80	6.49
	Frequencies	9	12
Group Exp (A_2)	Means	139.00	141.60
	Standard Deviation	4.35	6.02
	Frequencies	10	10

Figure 1, page 60, shows relationships for achievement and sex regarding Table 5.

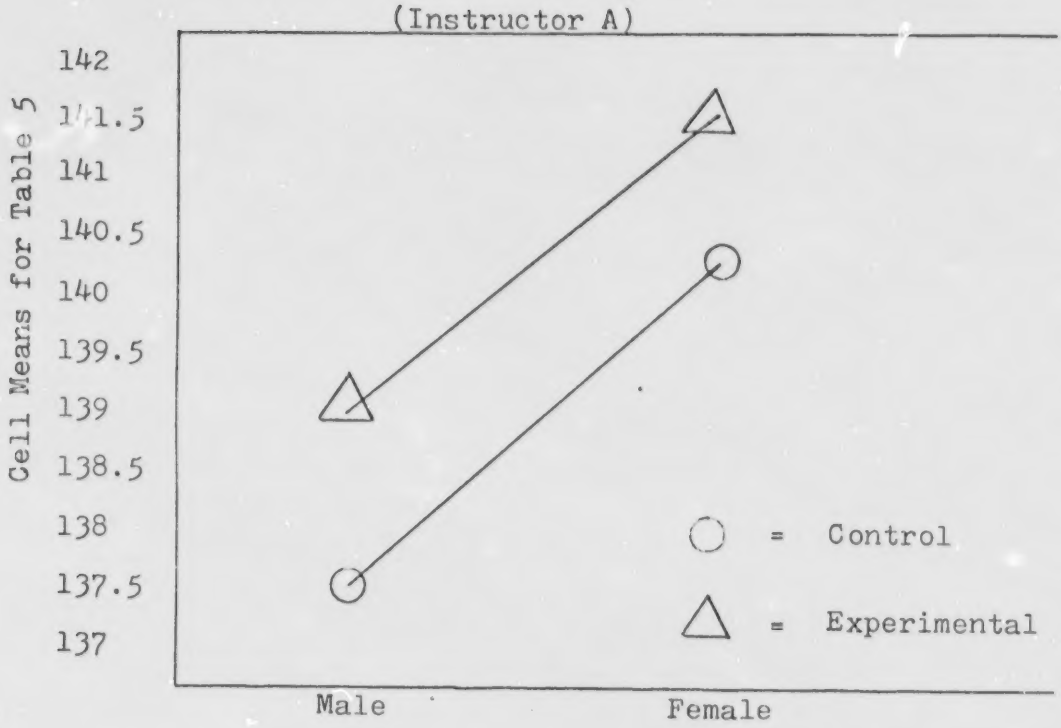

Figure 1. Relationships for achievement and sex on pretest.

The means, standard deviations and frequencies for males and females on the posttest algebra 1 achievement scores are shown in Table 6.

TABLE 6

MEANS, STANDARD DEVIATIONS, AND FREQUENCIES ON ALGEBRA 1 POSTTEST SCORES FOR MALES AND FEMALES

Treatments		Levels	
		Males (B_1)	Females (B_2)
Group Con (A_1)	Means	149.67	151.67
	Standard Deviation	6.16	7.92
	Frequencies	9	12
Group Exp (A_2)	Means	154.60	155.00
	Standard Deviation	6.59	8.89
	Frequencies	10	10

Figure 2, page 62, shows relationships for achievement and sex regarding Table 6.

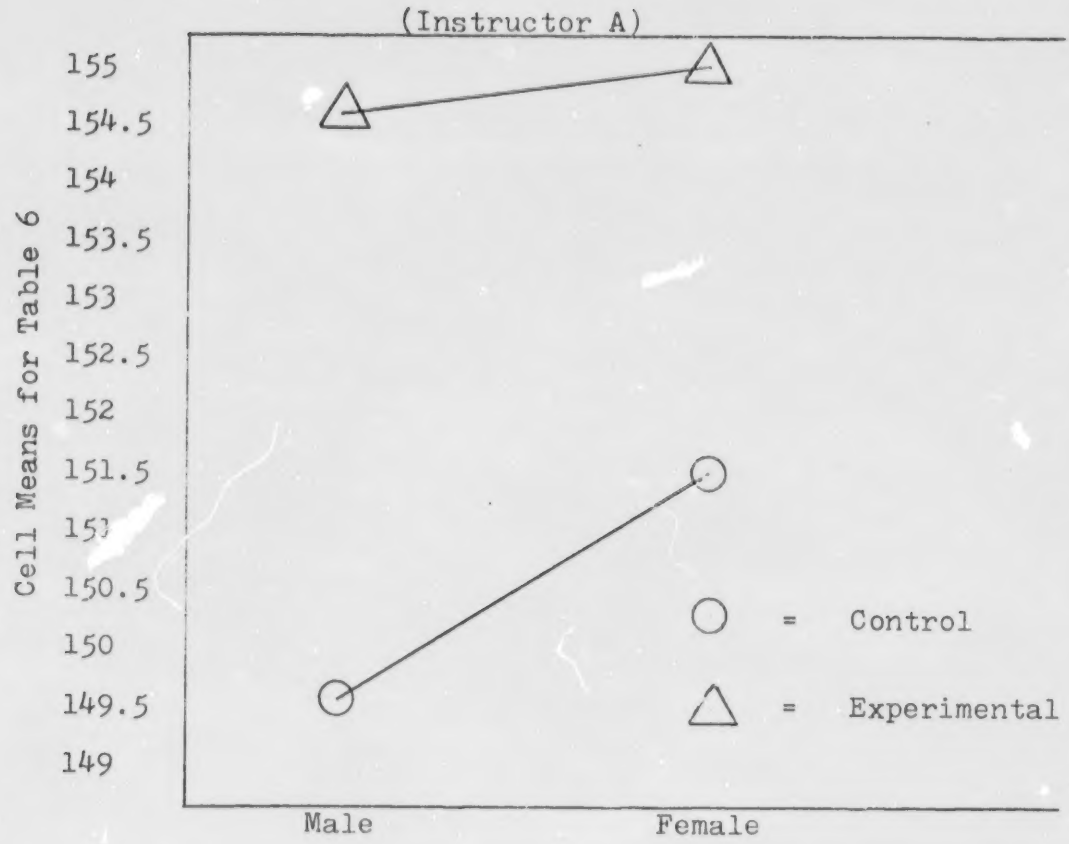

Figure 2. Relationships for achievement and sex on posttest.

Instructor B

Analysis of Hypothesis of No Significant Difference in Pretest-Posttest Achievement Test Scores Between Control and Experimental Groups

The measure of control and experimental group achievement in algebra 1 was the increase on the mean pretest-posttest scores on the Algebra I Tests of the Cooperative Mathematics Test Programs. Form A was given as the pretest. Form B was given as the posttest. The cell means, standard deviations, and frequencies for these achievement scores are shown in Table 7.

TABLE 7

MEANS, STANDARD DEVIATIONS, AND FREQUENCIES FOR ACHIEVEMENT

Treatments		Levels	
		Pretest (C_1)	Posttest (C_2)
Group Con (A_1)	Means	135.53	147.67
	Standard Deviation	4.50	7.82
	Frequencies	20	20
Group Exp (A_2)	Means	139.43	155.50
	Standard Deviation	7.97	8.99
	Frequencies	28	28

Table 8 is an Analysis of Variance Summary Table obtained from the data using the Three Factor Analysis of Variance with Repeated Measures on the C Factor Program at the George Peabody College Computer Center.

TABLE 8

ANOVA SUMMARY TABLE

Source	SS	df	MS	F	p
Total	10867.64	95			
Between	4951.64	47	105.35		
A (Male Con Group)	671.80	1	671.80	7.220	0.0099
B (Female Con Group)	101.42	1	101.42	1.090	N.S.
A X B	84.40	1	84.40	0.907	N.S.
Error (Between)	4094.02	44	93.05		
Within Subjects	5916.00	48			
C (Male Exp Group)	3885.04	1	3885.04	88.079	0.0000
A X C	75.74	1	75.74	1.717	N.S.
B X C	8.01	1	8.01	0.182	N.S.
A X B X C	6.43	1	6.43	0.146	N.S.
Error (Within)	1940.77	44			

This summary table indicates no significant difference between control and experimental groups on pretest-posttest mean scores at the .05 probability level.

Analysis of Hypothesis of No Significant Interaction Between Control and Experimental Groups and the Sex of the Student

The measure of male and female achievement in control and experimental groups was a measure of their mean pretest-posttest scores on the Algebra I Cooperative Tests.

The ANOVA Summary from Table 8 indicates no significant interaction on the pretest-posttest between the sex of the individual, and the experimental and control groups. Therefore, Hypothesis 2, the hypothesis of no significant difference between control and experimental groups, and the sex of the child, was retained.

The means, standard deviations and frequencies for males and females on the pretest algebra 1 achievement scores are shown in Table 9.

TABLE 9

MEANS, STANDARD DEVIATIONS, AND FREQUENCIES ON ALGEBRA I PRETEST SCORES FOR MALES AND FEMALES

Treatments		Levels	
		Males (B_1)	Females (B_2)
Group Con (A_1)	Means	135.60	135.47
	Standard Deviation	2.61	3.66
	Frequencies	5	5
Group Exp (A_2)	Means	141.00	137.86
	Standard Deviation	6.06	5.17
	Frequencies	14	14

Figure 3 shows relationships for achievement and sex regarding Table 9.

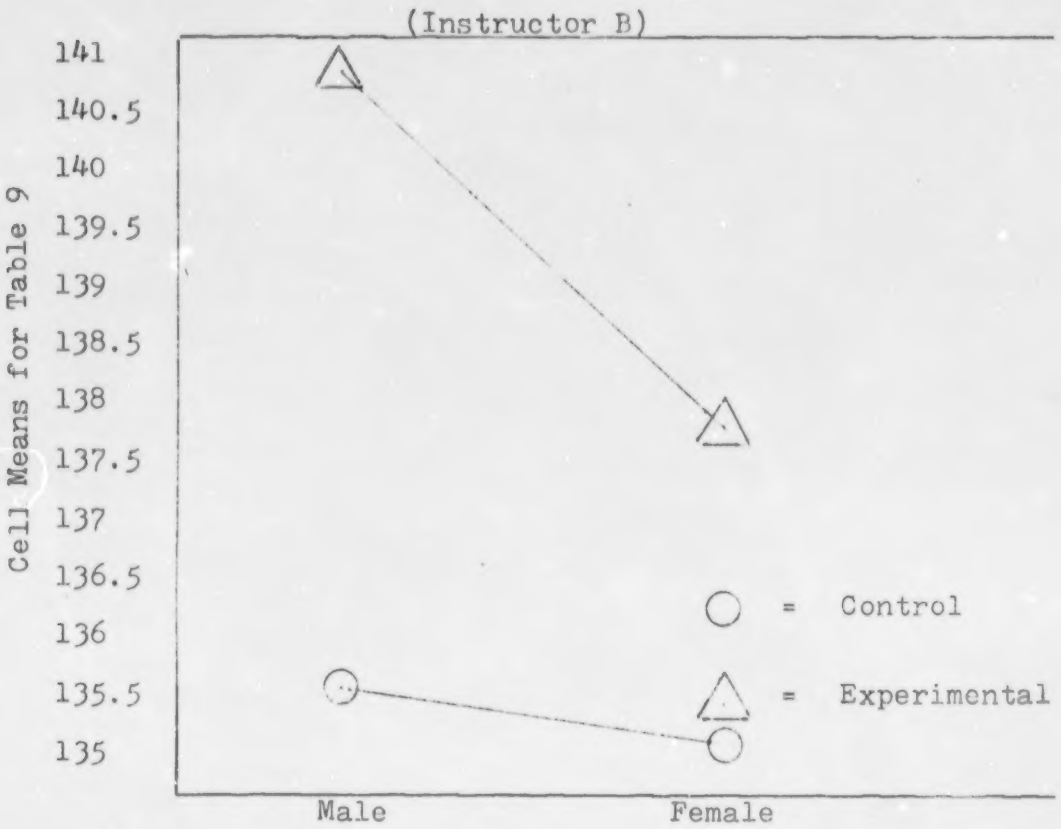

Figure 3. Relationships for achievement and sex on pretest.

The means, standard deviations and frequencies for males and females on the posttest Algebra I achievement scores are shown in Table 10, page 67.

Figure 4, page 68, shows relationships for achievement and sex regarding Table 10.

TABLE 10

MEANS, STANDARD DEVIATIONS, AND FREQUENCIES ON ALGEBRA I POSTTEST SCORES FOR MALES AND FEMALES

Treatments		Levels	
		Males (B_1)	Females (B_2)
Group Con (A_1)	Means	147.80	147.53
	Standard Deviation	5.93	5.10
	Frequencies	5	15
Group Exp (A_2)	Means	158.29	152.71
	Standard Deviation	5.80	6.88
	Frequencies	14	14

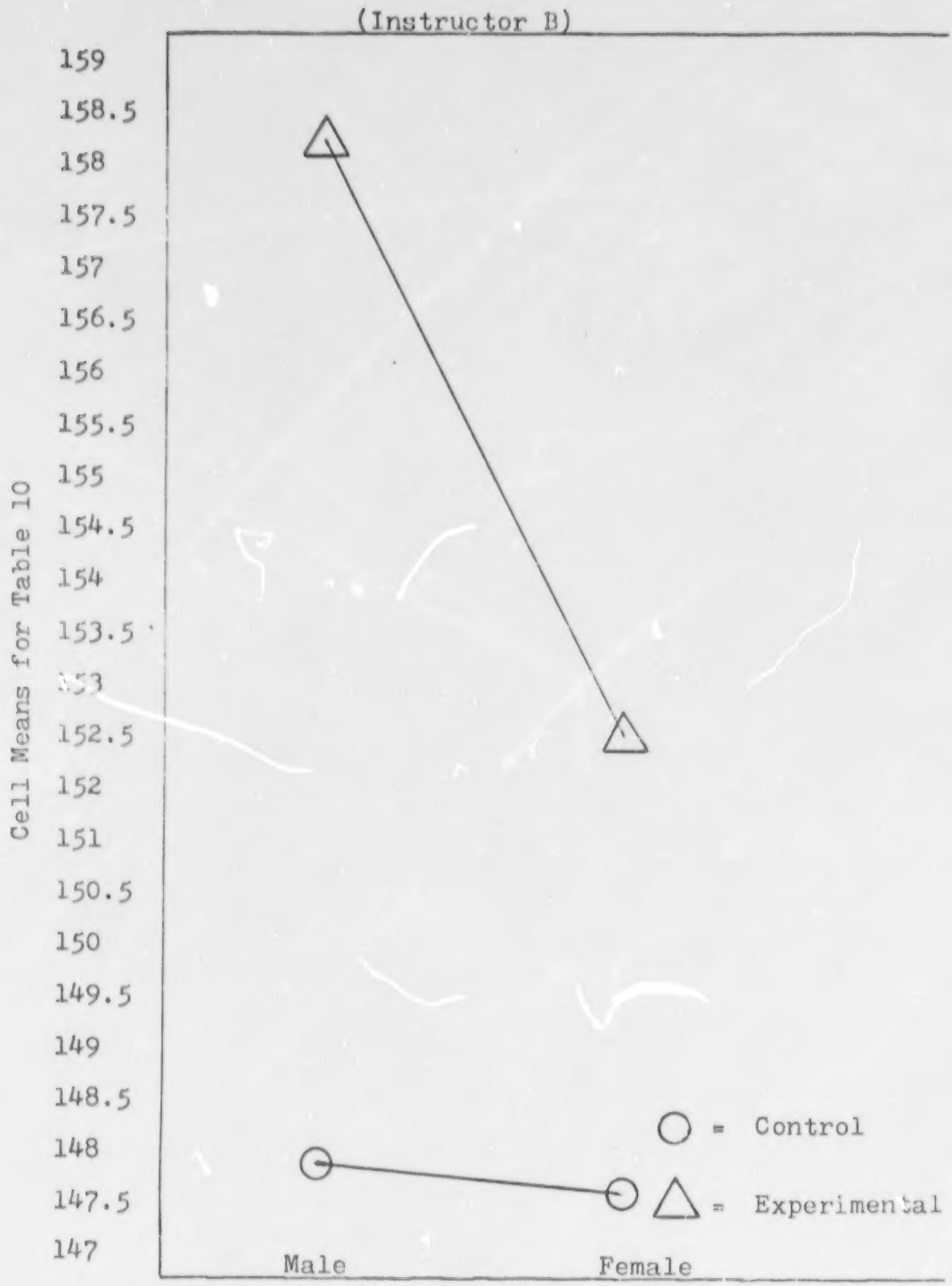

Figure 4. Relationships for achievement and sex on posttest.

Instructor C

Analysis of Hypothesis of No Significant Difference in Pretest-Posttest Achievement Test Scores Between Control and Experimental Groups

The measure of control and experimental group achievement in general biology was the increase on the mean pretest-posttest scores on the Biology Tests of the Cooperative Science Test Programs. Form A was given as the pretest. Form B was given as the posttest. The cell means, standard deviations, and frequencies for these achievement scores are shown in Table 11.

TABLE 11

MEANS, STANDARD DEVIATIONS, AND FREQUENCIES FOR ACHIEVEMENT

Treatments		Levels	
		Pretest (C_1)	Posttest (C_2)
Group Con (A_1)	Means	137.73	141.36
	Standard Deviation	8.16	10.62
	Frequencies	22	22
Group Exp (A_2)	Means	137.33	144.81
	Standard Deviation	10.63	10.51
	Frequencies	21	21

Table 12 is an Analysis of Variance Summary Table obtained from the data using the Three Factor Analysis of Variance with Repeated Measures on the C Factor Program at the George Peabody College Computer Center.

TABLE 12

ANOVA SUMMARY TABLE

Source	SS	df	MS	F	P
Total	5268.09	85			
Between	3846.59	42	91.59		
A (Male Control Group)	6.24	1	6.24	0.065	N.S.
B (Female Control Group)	40.64	1	40.64	0.424	N.S.
A X B	59.55	1	59.55	0.621	N.S.
Error (Between)	3740.17	39	95.90		
Within Subjects	1421.50	43			
C (Male Exp Group)	604.24	1	604.24	33.885	0.0000
A X C	99.36	1	99.36	5.572	0.0220
B X C	4.58	1	4.58	0.257	N.S.
A X B X C	17.87	1	17.87	1.002	N.S.
Error (Within)	695.45	39			

This summary table indicates a significant interaction between the levels of factors A and C at the .05 level.

This interaction between treatments and levels was analyzed on the following post hoc study.

Post Hoc Study of Student Achievement (A by C)

The One-Way Analysis of Variance for Repeated Measures was the statistical method used to determine where significant differences occurred between treatments and levels.[2]

All calculations for the One-Way ANOVA were performed by the computer programs available in the statistical library at the George Peabody College Computer Center.

Four One-Way ANOVA'S were calculated in determining significant differences. These four analyses are presented in the following order:

1. Control group difference between pretest and posttest

	Pre	Post
Control	137.73	141.36

2. Experimental group difference between pretest and posttest

	Pre	Post
Experimental	137.33	144.81

3. Pretest difference between control and experimental groups

	Pre
Con	137.73
Exp	137.33

4. Posttest difference between control and experimental groups

	Post
Con	141.36
Exp	144.81

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[2] Peabody Manual, pp. 6.1.1-6.1.6.

A summary, obtained from the data using the One-Way ANOVA, is presented for each analysis.

1. Table 13 is a One-Way ANOVA summary table for analysis of control group difference between pretest and posttest.

TABLE 13

ONE-WAY ANOVA FOR CONTROL GROUP DIFFERENCE BETWEEN PRETEST AND POSTTEST

Source	SS	df	MS	f	p
Subjects	1593.94	21			
Treatments	145.50	1	145.50	9.39	0.0060
Error	325.50	21	15.50		
Total	2064.94	43			

This summary table indicates a significant increase from pretest to posttest for the control group at the .05 level.

2. Table 14, page 73, is a One-Way ANOVA summary table for analysis of experimental group difference between pretest and posttest.

This summary table indicates a significant increase for pretest to posttest for the experimental group at the .05 level.

3. Table 15, page 73, is a One-Way ANOVA summary table for analysis of pretest difference between control and experimental groups.

TABLE 14

ONE-WAY ANOVA FOR EXPERIMENTAL GROUP DIFFERENCE BETWEEN PRETEST AND POSTTEST

Source	SS	df	MS	f	p
Subjects	2262.31	20			
Treatments	586.94	1	586.94	32.29	0.0001
Error	363.56	20	18.18		
Total	3212.81	41			

TABLE 15

ONE-WAY ANOVA FOR PRETEST DIFFERENCE BETWEEN CONTROL AND EXPERIMENTAL GROUPS

Source	SS	df	MS	F	p
Between Groups	1.67	1	1.67	0.04	0.8411
Within Groups	1885.03	41	45.98		
Total	1886.70	42			

This summary table indicates no significant difference between control and experimental groups on the pretest at .05 level.

4. Table 16, page 74, is a One-Way ANOVA summary table for analysis of posttest difference between control and experimental groups.

TABLE 16

ONE-WAY ANOVA FOR POSTTEST DIFFERENCE BETWEEN CONTROL AND EXPERIMENTAL GROUPS

Source	SS	df	MS	F	p
Between Groups	127.58	1	127.58	1.97	0.1651
Within Groups	2660.34	41	64.89		
Total	2787.92	42			

This summary table indicates no significant difference between control and experimental groups on the posttest at the .05 level.

Analysis of the four preceding summary tables shows posttest scores are significantly higher than pretest scores for both the control and the experimental groups at the .05 level. This analysis also shows no significant difference between the pretest and posttest scores for the control and experimental groups at the .05 level. Therefore, Hypothesis, 1, the hypothesis of no significant difference in the pretest-posttest achievement test scores between control and experimental groups was retained.

Analysis of Hypothesis of No Significant Interaction Between Control and Experimental Groups and the Sex of the Student

The measure of male and female achievement in control and experimental groups was a measure of their mean pretest-posttest scores on the Biology Cooperative Tests.

The ANOVA summary from Table 12 indicates no significant interaction on the pretest-posttest between the sex of the individual, and the experimental and control groups. Therefore, Hypothesis 2, the hypothesis of no significant difference between control and experimental groups, and the sex of the child, was retained.

The means, standard deviations and frequencies for males and females on the pretest Biology Achievement Scores are shown in Table 17.

TABLE 17

MEANS, STANDARD DEVIATIONS, AND FREQUENCIES ON BIOLOGY PRETEST SCORES FOR MALES AND FEMALES

Treatments		Levels	
		Males (B_1)	Females (B_2)
Group Con (A_1)	Means	138.25	137.43
	Standard Deviation	4.95	6.49
	Frequencies	8	14
Group Exp (A_2)	Means	133.60	138.50
	Standard Deviation	7.54	7.50
	Frequencies	5	16

Figure 5, page 76, shows relationships for achievement and sex regarding Table 17.

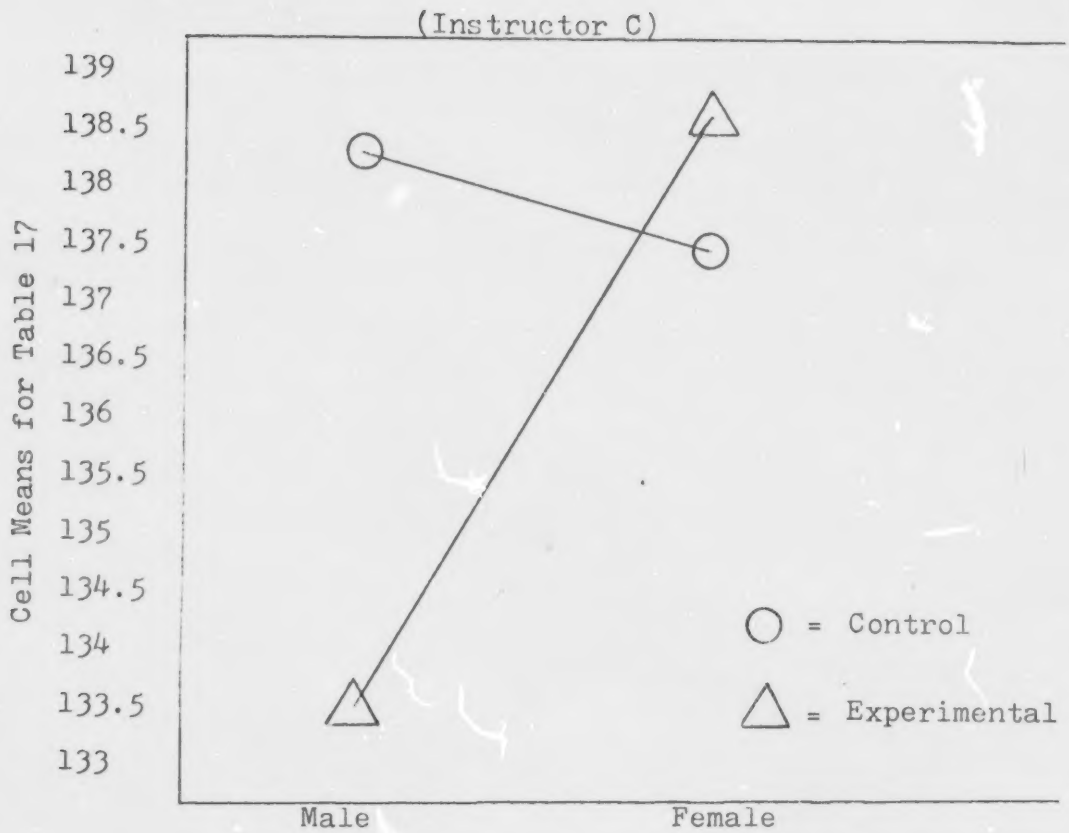


Figure 5. Relationships for achievement and sex on pretest.

The means, standard deviations and frequencies for males and females on the posttest Biology Achievement Scores are shown in Table 18.

TABLE 18

MEANS, STANDARD DEVIATIONS, AND FREQUENCIES ON BIOLOGY POSTTEST SCORES FOR MALES AND FEMALES

Treatments		Levels	
		Males (B_1)	Females (B_2)
Group Con (A_1)	Means	141.25	141.43
	Standard Deviation	6.71	8.23
	Frequencies	8	14
Group Exp (A_2)	Means	143.40	145.25
	Standard Deviation	4.34	9.57
	Frequencies	5	16

Figure 6, page 78, shows relationships for achievement and sex regarding Table 18.

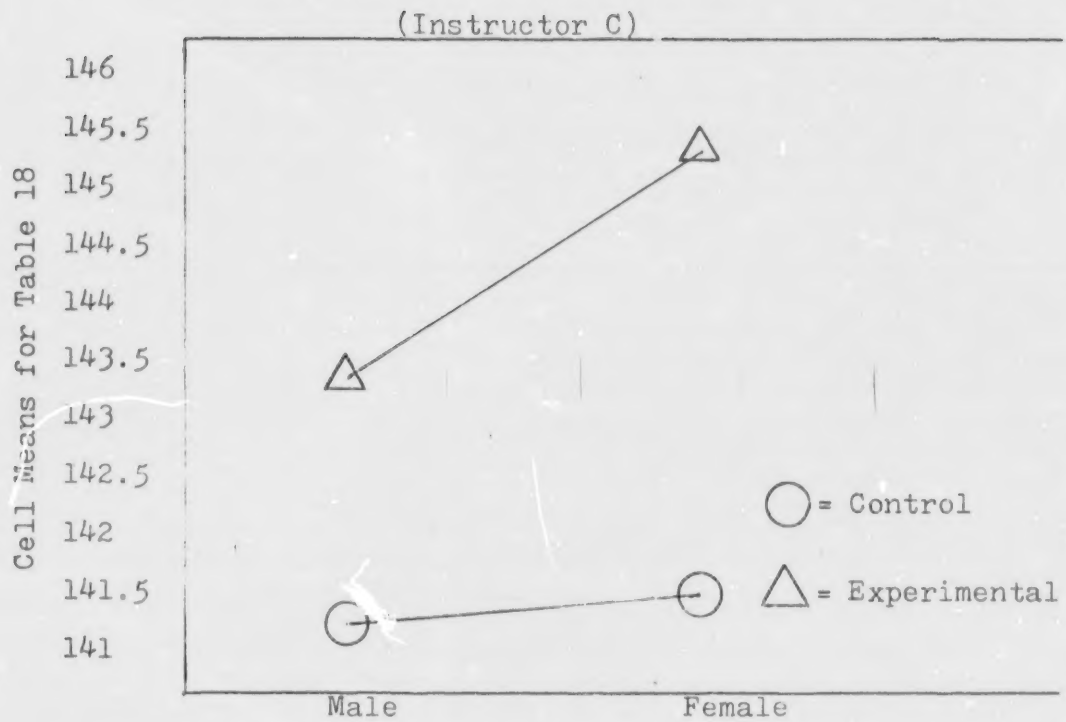


Figure 6. Relationships for achievement and sex on posttest.

Instructor D

Analysis of Hypothesis of No Significant Difference in Pretest-Posttest Achievement Test Scores Between Control and Experimental Groups

The measure of control and experimental group achievement in general biology was the increase on the mean pretest-posttest scores on the Biology Tests of the Cooperative Science Test Programs. Form A was given as the pretest. Form B was given as the posttest. The cell means, standard deviations, and frequencies for these achievement scores are shown in Table 19.

TABLE 19

MEANS, STANDARD DEVIATIONS, AND FREQUENCIES FOR ACHIEVEMENT

Treatments		Levels	
		Pretest (C_1)	Posttest (C_2)
Group Con (A_1)	Means	134.30	141.90
	Standard Deviation	1[illegible].93	11.85
	Frequencies	15	15
Group Exp (A_2)	Means	135.71	144.96
	Standard Deviation	11.87	12.73
	Frequencies	11	11

Table 20 is an Analysis of Variance Summary Table obtained from the data using the Three Factor Analysis of Variance with Repeated Measures on the C Factor Program at the George Peabody College Computer Center.

TABLE 20

ANOVA SUMMARY TABLE

Source	SS	df	MS	F	p
Total	5945.30	51			
Between	4680.30	25	187.21		
A (Male Control Group)	57.90	1	57.90	0.277	N.S.
B (Female Control Group)	22.28	1	22.28	0.107	N.S.
A X B	0.51	1	0.51	0.002	N.S.
Error (Between)	4599.60	22	209.07		
Within Subjects	1265.00	26			
C (Male Exp Group)	819.57	1	819.57	44.38	0.0000
A X C	7.86	1	7.86	0.426	N.S.
B X C	7.86	1	7.86	0.426	N.S.
A X B X C	23.44	1	23.44	1.270	N.S.
Error (Within)	406.26	22			

Table 20 indicates no significant difference between control and experimental groups on pretest-posttest mean

scores at the .05 level. Therefore, Hypothesis 1, the hypothesis of no significant difference in the pretest-posttest achievement test scores between control and experimental groups, was retained.

Analysis of Hypothesis of No Significant Interaction Between Control and Experimental Groups and the Sex of the Student

The measure of male and female achievement in control and experimental groups was a measure of their mean pretest-posttest scores on the Biology Cooperative Tests.

The ANOVA Summary from Table 20 indicates no significant interaction on the pretest-posttest betwen the sex of the individual, and the experimental and control groups. Therefore, Hypothesis 2, the hypothesis of no significant difference between control and experimental groups and the sex of the child, was retained.

The means, standard deviations and frequencies for males and females on the pretest Biology Achievement Scores are shown in Table 21, page 82.

Figure 7, page 83, shows relationships for achievement and sex regarding Table 21.

The means, standard deviations and frequencies for males and females on the posttest Biology Achievement Scores are shown in Table 22, page 84.

Figure 8, page 85, shows relationships for achievement and sex regarding Table 22.

TABLE 21

MEANS, STANDARD DEVIATIONS, AND FREQUENCIES ON BIOLOGY PRETEST SCORES FOR MALES AND FEMALES

Treatments		Levels	
		Males (B_1)	Females (B_2)
Group Con (A_1)	Means	134.80	133.80
	Standard Deviation	11.71	9.26
	Frequencies	5	10
Group Exp (A_2)	Means	137.43	134.00
	Standard Deviation	6.08	10.20
	Frequencies	7	4

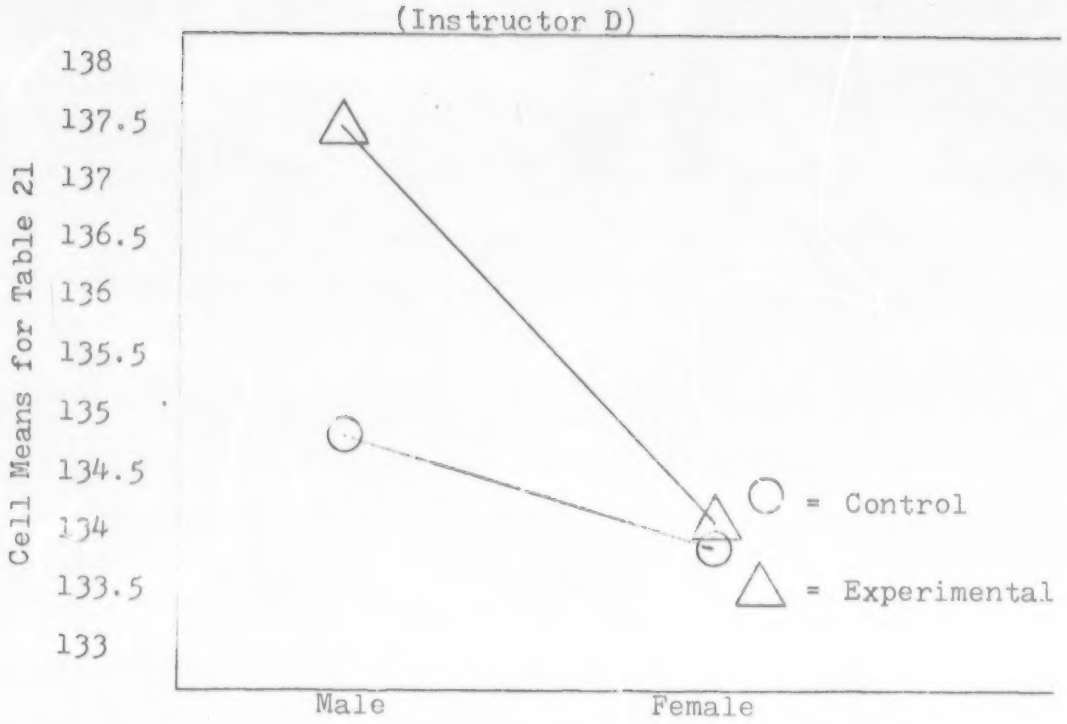


Figure 7. Relationships for achievement and sex on pretest.

TABLE 22

MEANS, STANDARD DEVIATIONS, AND FREQUENCIES ON BIOLOGY POSTTEST SCORES FOR MALES AND FEMALES

Treatments		Levels	
		Males (B_1)	Females (B_2)
Group Con (A_1)	Means	143.00	140.80
	Standard Deviation	8.72	8.02
	Frequencies	5	10
Group Exp (A_2)	Means	144.43	145.50
	Standard Deviation	6.40	11.00
	Frequencies	7	4

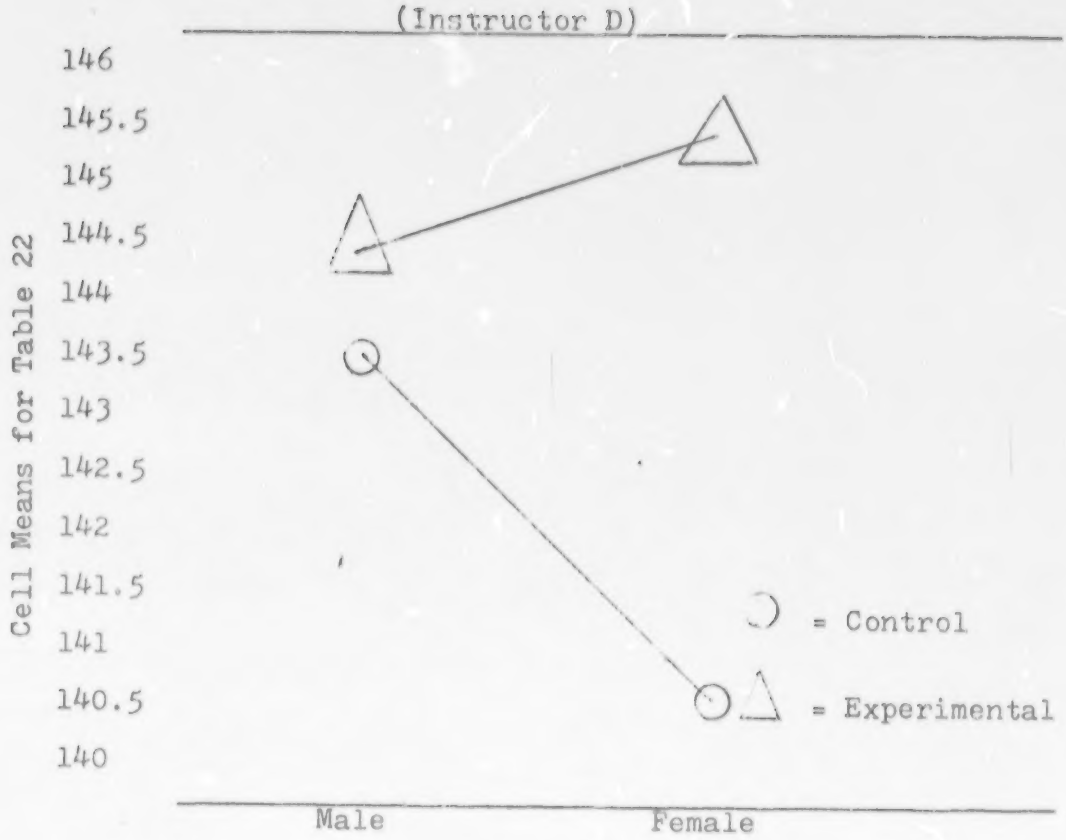


Figure 8. Relationships for achievement and sex on posttest.

A summary of this chapter shows that no significant increases were found between control and experimental groups for any of the four separate investigations in this study ($p > .05$). Therefore, Hypothesis 1, the hypothesis of no significant difference on the pretest-posttest achievement test scores between control and experimental groups was retained for each of the four separate investigations. Experimental groups showed insignificant increases over control groups for each of the four separate investigations.

No significant differences were found between control and experimental groups and the sex of the student for any of the four separate investigations in this study ($p > .05$). Therefore, Hypothesis 2, the hypothesis of no significant interaction between control and experimental groups and the sex of the student was retained for each of the four separate investigations.

CHAPTER V

SUMMARY, CONCLUSIONS, IMPLICATIONS, RECOMMENDATIONS TO IMPROVE STUDY, AND SUGGESTIONS FOR FURTHER STUDY

Summary

This quasi-experimental study was designed to investigate the effects of student-parent interaction, regarding homework assignments, on the achievement scores of ninth and tenth grade algebra 1 and general biology classes. The study also investigated whether differences existed between male and female subjects on the homework assignment interaction, mentioned above.

The study was conducted during the fall, 1978, at two ninth- and tenth-grade secondary schools in the Alexandria City, Virginia School District. This school district had a total enrollment of approximately twelve thousand students. The average size of each secondary school was approximately nine hundred students. The sample at each secondary school was four classes. Two classes were algebra 1 and two classes were general biology. The two classes of algebra 1 were randomly selected as control and experimental groups. Biology classes were also randomly selected as control and experimental groups. One teacher taught both control

and experimental classes for algebra 1. A separate teacher taught both control and experimental groups for general biology. The treatments were the experimental groups, use of the student-tutor and parent interaction program and the control groups, having no student-tutor and parent interaction program provided. The researcher administered the appropriate pretests to control and experimental groups. Experimental groups were given the treatment for approximately three months. At the end of the three month period the researcher administered the appropriate posttests to control and experimental groups. During the study, experimental group students were classified into three categories:

1. Active participants--students consistently interacting with their parent or parents;

2. Participants--students taking the pretest and posttest but not consistently interacting with their parents;

3. Nonparticipants--students not agreeing to participate in this study.

Only active participant and participant experimental group scores were used in the statistical analysis. Control group scores, used in the analysis, were from students taking the pretest and posttest.

The experimental design was a Three Factor Analysis of Variance with Repeated Measures on the Third Factor (pretest-posttest). This design allowed the investigation

of interaction between control and experimental groups on the achievement tests at the .05 level. The design also allowed the investigation of interaction between sex of students and treatments. Each instructor's classes were compared separately. No statistical comparisons were made between classes taught by different instructors. The design indicated no significant interactions between treatments and levels (pretest-posttest) at the .05 level for three of the four analyses. A significant interaction at the .05 level was indicated for the groups taught by one biology instructor. A post hoc analysis of this interaction using a One-Way Analysis of Variance showed no significant difference between control and experimental groups on the pretest-posttest at the .05 probability level. Therefore, the hypothesis of no significant interaction between control and experimental groups on the pretest-posttest was retained for each of the four separate investigations in this study. The experimental design showed no significant interactions between sex of the students and treatments. Therefore, the hypothesis of no significant interaction between sex of the student and treatments was retained.

The following generalizations refer to the students enrolled in algebra 1 and general biology in the secondary schools of the Alexandria City, Virginia School System. It is possible to conceive of the results of this

experiment as applicable to the population of secondary school students taking algebra 1 and general biology in similar school districts.

Conclusions

Analysis of the data collected on algebra 1 and general biology achievement of the students in this experiment led to the following conclusions:

1. There was no significant difference in achievement between control and experimental groups on the pretest-posttest for each of the four separate investigations in this study.

2. . There was no significant difference in achievement between sex of the student and treatments for each of the four separate investigations in this study.

3. There were insignificant increases in achievement of experimental groups over control groups on the pretest-posttest for each of the four separate investigations in this study.

Summaries of active participant students, active participant parents, and instructors evaluation of the student-parent interaction program used in this study are given in Appendix G. Effectiveness of the program was rated on a scale of 1 - 10 (10 = extremely effective, 1 = extremely ineffective). Responses for the four experimental groups were averaged. Active participant students

rated the program 5.85. Active participant parents rated the program 6.43. Instructors rated the program 7.50.

Forty-six out of ninety (51.1 percent) of the students in the combined experimental groups actively participated in the study. Thirty-four out of ninety (37.9 percent) of the students in the combined experimental groups participated, but not actively. Therefore, 11.1 percent (10 out of the students in the combined experimental groups did not agree to participate in the study (Appendix F). This summary shows that 88.9 percent of the students in the four experimental groups agreed to participate in the program.

Finally, the author was able to implement the student-parent interaction study in the process of teaching algebra 1 and general biology without incurring additional expenses or requiring special facilities.

Implications

In the comparison of experimental group to control group for each instructor, no significant differences in achievement were found. This indicated that factors other than giving students the opportunity to initiate interaction with their parents in academic areas are responsible for the performance of the students in the secondary schools in the Alexandria, Virginia School District.

No significant differences were found between males and females in control and experimental groups on

achievement scores. This indicated that similar studies could be undertaken without provision for a performance difference between males and females providing the population have similar characteristics.

Eighty of the ninety students in the experimental groups agreed to participate in this student-parent interaction study. This showed that similar studies could be successfully implemented without rejection by secondary students at this grade level.

Insignificant increases in achievement of experimental groups over control groups were found in each of the four separate investigations in this study. This indicated that the program may have produced significant increases if the length of the study was extended.

Recommendations to Improve the Study

Three of the four instructors involved in this study indicated interest in using this method of instruction with the following changes:

1. Verbal contact with parents should be made after the first couple of weeks to promote questionnaire return.

2. Students should be counseled to be more open-minded regarding the questionnaire as an educational tool.

3. Parents should be contacted verbally regarding the intent of the program.

Suggestions for Further Study

1. A similar study could be conducted using random sampling. This could make the study more internally valid.

2. A similar experiment could be conducted using other courses since the effectiveness of the student-tutor and parent interaction model may depend on the educational environment regarding subject matter.

3. A similar study could be conducted using other grade levels since the effectiveness of the model may depend on the maturity level of the students using it.

4. A similar experiment could be conducted using major test scores as an achievement indicator. This could be a more valid method of measuring achievement since major tests may be more closely oriented toward the teachers' objectives.

5. A similar study could be conducted extending the length of time in using the student-parent interaction model, since a lack of time may have been the reason significant increases were not found between experimental and control groups in this study.

APPENDIX A

CHART FOR RESEARCH STUDY

SCHEDULE OF ACTIVITIES FOR STUDY						
ACTIVITIES	DATES					
	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.-May.
Meet with principals						
Meet with teachers A, B, C, D						
Reproduce materials for teachers in study						
Give pretests to groups						
Start treatment						
Meet with teachers A, B, C, D						
Give posttest to groups						
Send parents questionnaires						
Data analysis						
Report preparation						

APPENDIX B.

TWO TEXTBOOKS USED IN THE STUDY

ALGEBRA I

The classes taught by Instructors A and B use the following textbook:

Nichols, Eugene D.; Edwards, Mervine L.; Garland E. Henry; Hoffman, Sylvia A.; Mamary, Albert; Palmer, William F. Holt Algebra I. New York: Holt, Rinehart and Winston, 1974.

The classes taught by Instructors C and D used the following textbook:

Smallwood, William L.; Green, Edna R. Biology. Morristown, New Jersey: Silver Burdett Company, 1971.

APPENDIX C.

TEACHER DIRECTIONS

TEACHER DIRECTIONS

Experimental Group

1. Both experimental and control: Teacher assigns homework. (Teacher gives date homework is due.)

2. Day 1: Teacher interacts with students on homework assignment. Teacher either grades homework or allows students to check their own work. (Latter would be preferable due to time element.)

3. Day 2: Teacher gives tutor instructions to class. (Teacher passes out tutor direction sheet.) Teacher goes over tutor characteristics on sheet and may allow students who understand homework to tutor those who don't. Should take from one-half to three-quarters of a class period. (May vary.)

4. Day 2: Teacher gives students directions on interacting with their parents regarding the homework assignment just completed. The student-parent interaction direction sheet will be used for these directions. Copies do not have to be given to students. Last ten minutes of class.

5. Day 2: Each student is given a questionnaire and is told to have his/her parent answer the questions and sign the sheet following student attempt to explain the homework to the parent.
   a. Questionnaires are due the following day for parent input.
   b. Students should be persuaded to practice tutoring, according to tutor directions, on their parents as they explain homework to them.

6. Day 3: Teacher will interact with the students using the parent questionnaire responses as the basis for the interaction. This interaction will occur before the test on the homework assignment.
   a. Those that have a good record of returning the questionnaire on time will be given a certificate of accomplishment.
   b. The teacher will make all decisions regarding certificates.

NOTE: The above cycle should be followed for each major homework assignment. It would be preferable if the cycle could be used on the average of one time each week for the duration of the study.

NOTE: The control group will be taught as normal during the above three-day cycle. They will receive no interaction directions.

APPENDIX D

STUDY AIDS FOR STUDENTS

STUDENT INTERACTION DIRECTIONS

1. BE PREPARED: Try hard to understand the answers to all homework questions or problems.

2. Meet with your parent at a specific time after you have successfully completed your homework assignment.

   a. Give a general description of the subject matter before explaining specific answers to the homework questions or problems.

      1. In Algebra I you may wish to explain only the different kinds of problems rather than to explain different problems of the same kind over and over again.

      2. If you feel uncomfortable about a certain problem or question express this feeling to your parent since they may be able to help you with it.

3. Fill in the top line on the questionnaire regarding the general description of the subject matter.

   a. Tell your parent/guardian to answer the questions on the questionnaire. You should give the questionnaire to the teacher the very next day or the same day if the interaction has taken place on the morning before school.

4. The teacher will use the comments on the questionnaires to interact with the students before the next major test. Of course, any questions may be asked but the teacher will guide the discussion by using the parent questionnaire to guarantee student-parent-teacher interaction in the classroom.

TUTOR DIRECTIONS

Note: Being prepared and caring are two important elements of an overall attitude of an effective tutor.

1. Learn the assigned subject matter and understand the answers to all homework questions or problems. (BE PREPARED)

2. Meet with your tutee at a specific time each day after you have successfully completed your homework assignment. (Note: It is more important to meet each day for fifteen minutes than to meet for one hour every four days).

3. Learn as much as possible about your tutee regarding what your tutee can do now and what your tutee wants to be able to do in your subject matter area. (Note: This direction is especially important during the first session since this will help determine the direction for later sessions).

4. Be willing to help your tutee and also allow them to help you if they understand something that you do not. (CARING)

5. The tutor should keep records by use of a session log on which you should make informal notes about the tutee's work. Notes should not be taken during the tutor session but immediately following.

6. Be willing to work at improving your tutoring ability by improving in steps 1-5 above.

REMEMBER: YOUR GOAL IS TO IMPROVE AS A TUTOR. You can accomplish your goal only if you become effective in steps 1-6 above.

APPENDIX E

ACHIEVEMENT TEST INFORMATION

COOPERATIVE MATHEMATICS TESTS

What Do the Cooperative Mathematics Test Measure?

The Cooperative Mathematics Tests measure achievement in the major content areas of mathematics from junior high school arithmetic through calculus. Achievement is assessed in terms of students' comprehension of the basic concepts, techniques, and unifying principles in each content area. Where possible, many of the new trends and emphases in mathematics are represented in the tests, but content has been selected carefully to ensure the appropriateness of the tests for most students. Ability to apply understanding of mathematical ideas to new situations and to reason with insight are emphasized. Factual recall and computation are minimized.

How Is the Cooperative Algebra Series Organized?

The cooperative Algebra series is readily adaptable to most mathematics curricula.

Three algebra tests, designated I, II, and III, correspond approximately to courses frequently termed "elementary," "intermediate," and "college" algebra.

The algebra I test was used in this study. The content coverage and relative emphases of the test are shown on page 106.

How Do the Cooperative Mathematics Tests Measure?

The Cooperative Mathematics Tests utilize five-choice items. Separate answer sheets for hand scoring were used. Letters corresponding to the choices of the examinees were placed in numbered blank spaces.

The administration time for the test was 40 minutes. There are 40 questions.

All cooperative Mathematics Tests yield a raw total score obtained by counting the number of correct responses. Each student's raw score was changed to a converted score using the Algebra I Urban Norms. The reason for this conversion was the use of alternate forms. Alternate forms of the algebra I test have been equated to a common score scale. This is done because of difference in difficulty between items on each form. Thus, the converted scores make the alternate forms equivalent in difficulty.

General Directions

This is a 40-minute test.

Do not spend too much time on any one question. If a question seems too difficult, make the most careful guess you can, rather than waste time over it. Your score is the correct answers you mark. There are 40 questions.

Use scratch paper to work problems.

Mark all answers on the separate answer sheet. If you make a mistake be sure to erase your first choice completely.

When I say "Begin," open your test booklet and begin to work.

Ready? Begin!

Stop! (At the end of 40 minutes.) Even if you have not finished, you must stop and lay down your pencil.[1]

---

[1]Educational Testing Service, pp. 5-67.

CONTENT CLASSIFICATION

ALGEBRA I, FORM A AND B TEST

Topic	Number of Questions Included in the Test	
	Form A	Form B
Terminology	1	1
Combining Terms	3	3
Translation from Verbal to Algebraic Expressions	4	4
Solution of Linear Equations	4	4
Substitution in Algebraic Expressions and Equations	4	4
Solution of Literal Equations	2	1
Exponents and Roots	3	3
Algebraic Multiplication and Division	4	5
Averages	1	1
Systems of Linear Equations	2	2
Graphs of Linear Functions	2	2
Linear Inequalities and Order	4	4
Factoring and Quadratic Equations	4	4
Division by Zero	1	1
Variation	1	1

Name_____

Algebra I Answer Sheet

Directions: Your teacher will provide you with a pencil. Place the correct letter in the blank to the right of the number of the question. Do not write in the yellow pamphlet. Thank you.

1. _____
2. _____
3. _____
4. _____
5. _____
6. _____
7. _____
8. _____
9. _____
10. _____
11. _____
12. _____
13. _____
14. _____
15. _____
16. _____
17. _____
18. _____
19. _____
20. _____
21. _____
22. _____
23. _____
24. _____
25. _____
26. _____
27. _____
28. _____
29. _____
30. _____
31. _____
32. _____
33. _____
34. _____
35. _____
36. _____
37. _____
38. _____
39. _____
40. _____

COOPERATIVE SCIENCE TESTS

What Do the Cooperative Science Tests Measure?

The Cooperative Science Tests measure achievement in four major areas of the junior-senior high school science curriculum: general science, biology, chemistry, and physics. Achievement is assessed in terms of knowledge and understanding of basic concepts and principles, ability to apply knowledge in problem situations, and ability to analyze and evaluate scientific ideas and procedures.

The Biology test measures the outcomes of the typical high school biology course. The Biology test has two parts, either of which may be administered singly. Part I of the Biology test deals with human biology and the general structure, characteristics, and processes of living things. Part II was used in this three month study since it more closely matched the outline of the textbook used in Biology for the first three months. The content coverage and relative emphases of the test are shown on page 110.

How Do the Cooperative Science Tests Measure?

The Cooperative Science Tests utilize five-choice items. Separate answer sheets for hand scoring were used. Letters corresponding to the choices of the examinee were placed in numbered blank spaces.

The administration time for the test was 40 minutes.

All Cooperative Science Tests yield a raw total score obtained by counting the number of correct responses. Each student's raw score was changed to a converted score using the Biology Urban Norms. The reason for this conversion was the use of alternate forms. Alternate forms of the Biology test have been equated to a common score scale. This is done because of difference in difficulty between items on each form. Thus, the converted scores make the alternate forms equivalent in difficulty.

General Directions

This is a 40-minute test. The test has one 40-minute part. You will take Part II only.

Do not spend too much time on any one question. If a question seems to be too difficult, make the most careful guess you can, rather than waste time over it. There are 60 questions. Do not worry if you do not finish the test. Your score is the number of correct answers you mark.

Use scratch paper to work problems. Mark all answers on the separate answer sheet. If you make a mistake or wish to change and answer, be sure to erase your first choice completely.

When I say "Begin," open your test booklet and begin to work.

Ready? Begin!

Stop! (At end of 40 minutes.) Even if you have not finished, you must stop and lay down your pencil.[1]

---

[1]Educational Testing Service, pp. 10-66.

CONTENT CLASSIFICATION FOR PART II

BIOLOGY, FORM A AND B TEST

Topic	Number of Questions Included in the Test	
	Form A	Form B
Classifications	1	1
Major Plant Groups	3	1
Major Animal Groups	6	3
Ecology and Conservation	6	13
Distinctive Characteristics of Typical Forms	9	9
Anatomy of Typical Forms	14	7
Life Cycles of Typical Organs	8	11
Physiology of Typical Organs	13	15

Name_____

BIOLOGY ANSWER SHEET

Directions: Your teacher will pro.ide you with a pencil. Place the correct letter in the blank to the right of the number of the question. Do not write in the green test pamphlet. Thank you.

1._____ 21._____ 41._____

2._____ 22._____ 42._____

3._____ 23._____ 43._____

4._____ 24._____ 44._____

5._____ 25._____ 45._____

6._____ 26._____ 46._____

7._____ 27._____ 47._____

8._____ 28._____ 48._____

9._____ 29._____ 49._____

10._____ 30._____ 50._____

11._____ 31._____ 51._____

12._____ 32._____ 52._____

13._____ 33._____ 53._____

14._____ 34._____ 54._____

15._____ 35._____ 55._____

16._____ 36._____ 56._____

17._____ 37._____ 57._____

18._____ 38._____ 58._____

19._____ 39._____ 59._____

20._____ 40._____ 60._____

APPENDIX F

DATA ON SUBJECTS

SUMMARY OF CLASS SIZES FROM PRETEST TO POSTTEST
CONTROL AND EXPERIMENTAL GROUPS

	Instructor							
	A		B		C		D	
	Con	Exp	Con	Exp	Con	Exp	Con	Exp
Pretest (Class Size)	24	23	28	34	23	19	23	24
Pretest (Students Taking Pretest)	24	23	26	34	23	18	23	23
Posttest (Class Size)	21	23	26	29	23	16	22	19
Posttest (Students Taking Pretest & Posttest)	21	20	20	28	22	11	21	15
Attrition (From Pretest to Posttest)	3	0	2	5	0	3	1	5
Students Not Taking Posttest and/or Pretest and Enrolled)	0	3	6	1	1	5	1	4

SUMMARY OF QUASI-EXPERIMENTAL DESIGN

Instructor	Group	Students Taking Pretest	Date	Students Taking Posttest	Date	Period and Time*	School Code
A	Con	24	9/21/78	21	12/13/78	2 10:10 A.M. 11:10 A.M.	X
	Exp	23	9/21/78	20	12/13/78	1 8.55 A.M. 10:05 A.M.	X
B	Con	26	9/20/78	20	12/14/78	6 2:35 P.M. 3:30 P.M.	Y
	Exp	34	9/20/78	28	12/14/78	4 12:35 P.M. 1:30 P.M.	Y
C	Con	23	9/21/78	22	12/13/78	6 2:40 P.M. 3:30 P.M.	X
	Exp	23	3/21/78	21	12/13/78	5 1:45 P.M. 2:35 P.M.	X
D	Con	23	9/20/78	15	12/14/78	3 11:35 A.M. 12:30 P.M.	Y
	Exp	18	9/20/78	11	12/14/78	1 8:55 A.M. 9:55 A.M.	Y

*See bell schedules for secondary schools in Appendix on following page.

REGULAR BELL SCHEDULES

SCHOOL X		SCHOOL Y	
Period	Time	Period	Time
1	8:55 - 10:05	1	8:55 - 9:55
2	10:10 - 11:05	2	10:00 - 10:55
3	11:10 - 12:00	Lunch	11:00 - 11:30
Lunch	12:05 - 12:45	3	11:35 - 12:30
4	12:50 - 1:40	4	12:35 - 1:30
5	1:45 - 2:35	5	1:35 - 2:30
6	2:40 - 3:30	6	2:35 - 3:30

INSTRUCTOR A

SUMMARY OF MEANS FOR ALL EFFECTS, CELL MEANS, AND CELL VARIANCES

Means For All Effects

A Main

1	2
144.81	144.55

B Main

1	2
145.21	147.15

C Main

1	2
139.62	152.73

A By B

	1	2
1	143.61	146.00
2	146.80	148.30

A By C

	1	2
1	138.94	150.67
2	140.30	154.80

B By C

	1	2
1	138.28	152.13
2	140.97	153.33

Cell Means (Block = C Levels)

	1	2
1	137.56	140.33
2	139.00	141.60

	1	2
1	149.67	151.67
2	154.60	155.00

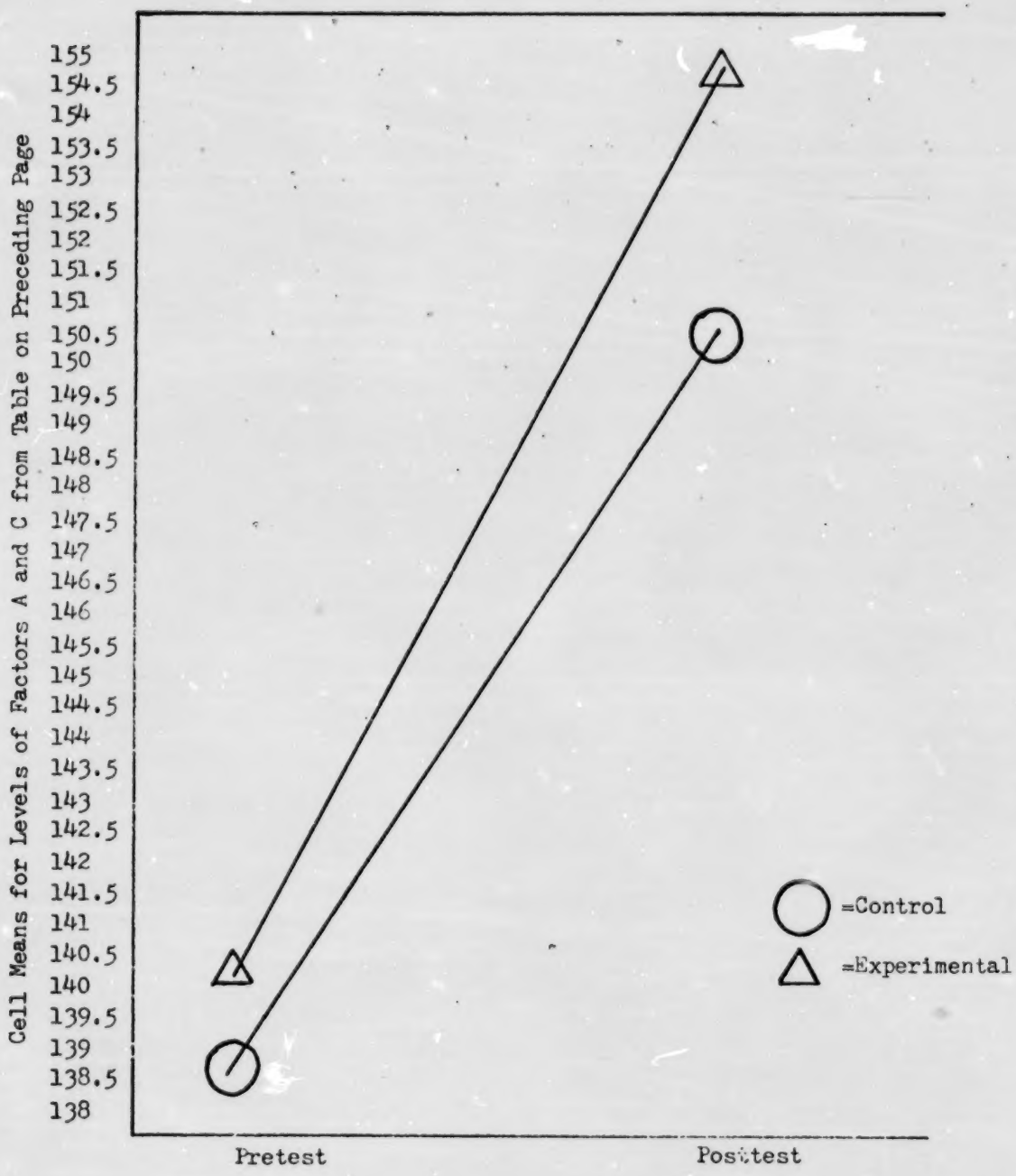
Cell Variances (Blocks = C Levels)

	1	2
1	60.78	42.06
2	18.89	36.27

	1	2
1	38.00	62.79
2	43.38	79.11

FIGURE 9

TREND LINES FOR ACHIEVEMENT
(Instructor A)



INSTRUCTOR B

SUMMARY OF MEANS FOR ALL EFFECTS, CELL MEANS, AND CELL VARIANCES

Means For All Effects

A Main

1	2
141.60	147.46

B Main

1	2
145.67	143.39

C Main

1	2
137.48	151.58

A By B

	1	2
1	141.70	141.50
2	149.64	145.29

A By C

	1	2
1	135.53	147.67
2	139.43	155.50

B By C

	1	2
1	138.30	153.04
2	136.66	150.12

Cell Means (Block = C Levels)

	1	2
1	135.60	135.47
2	141.00	137.86

	1	2
1	147.80	147.53
2	158.29	152.71

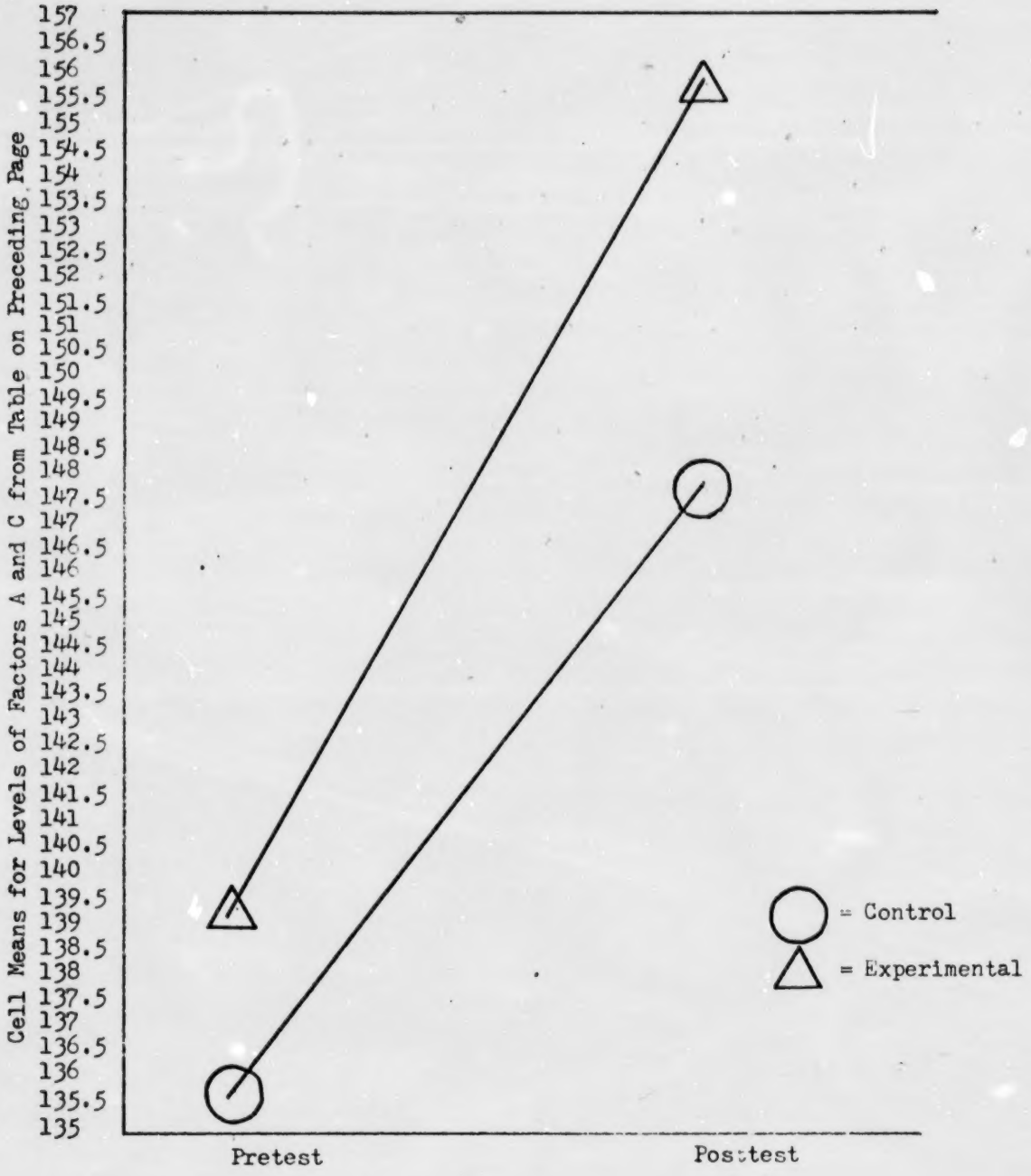
Cell Variances (Blocks = C Levels)

	1	2
1	6.80	13.41
2	36.77	26.75

	1	2
1	35.20	25.98
2	33.60	47.30

FIGURE 10

TREND LINES FOR ACHIEVEMENT
(Instructor B)



INSTRUCTOR C

SUMMARY OF MEANS FOR ALL EFFECTS, CELL MEANS, AND CELL VARIANCES

Means For All Effects

A Main

1	2
139.59	140.19

B Main

1	2
139.13	140.65

C Main

1	2
136.94	142.83

A By B

	1	2
1	139.75	139.43
2	138.50	141.88

A By C

	1	2
1	137.73	141.36
2	137.33	144.81

B By C

	1	2
1	135.93	142.32
2	137.96	143.34

Cell Means (Block = C Levels)

	1	2
1	138.25	137.43
2	133.60	138.50

	1	2
1	141.25	141.43
2	143.40	145.25

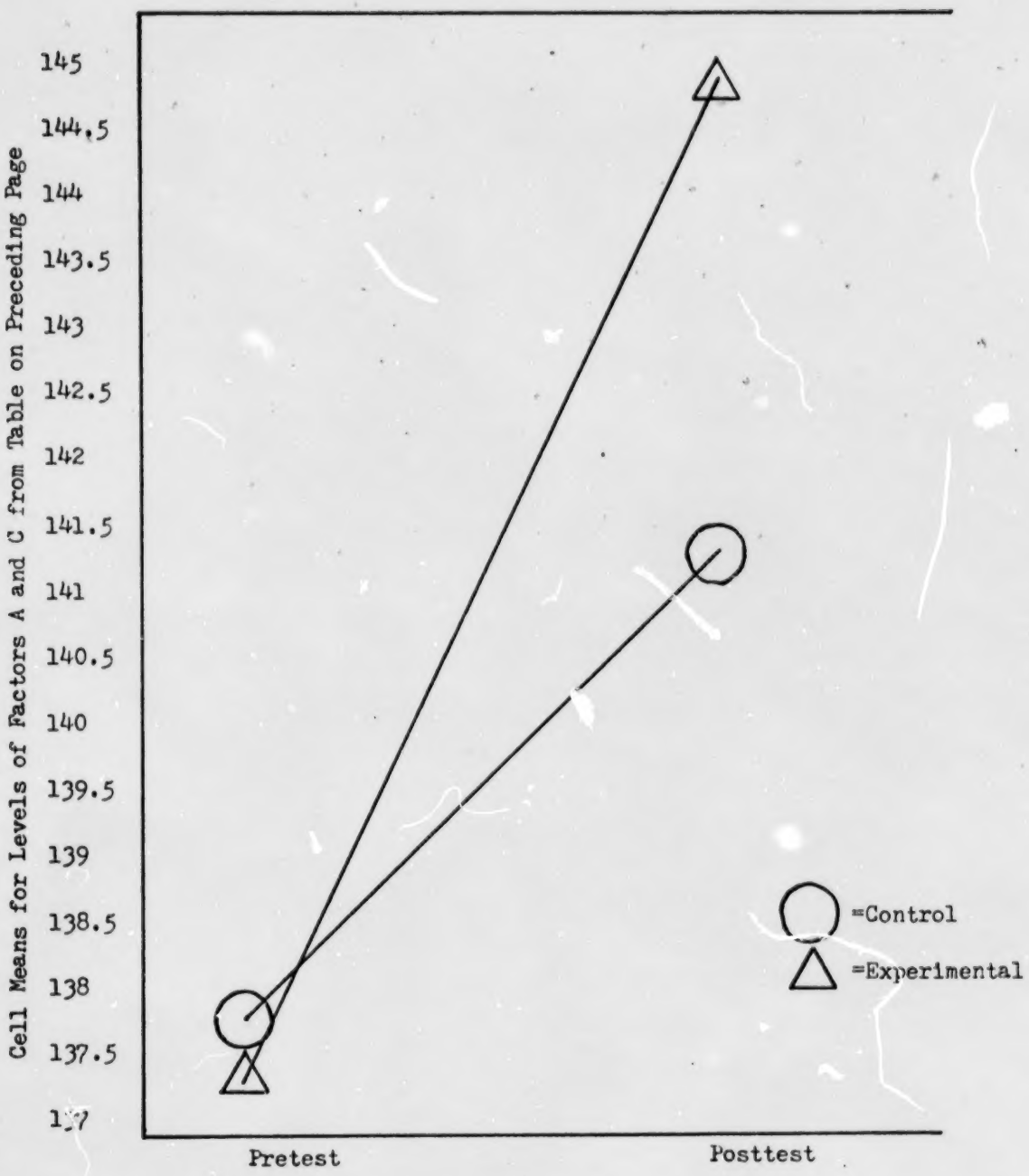
Cell Variances (Blocks = C Levels)

	1	2
1	24.50	42.11
2	56.80	56.27

	1	2
1	45.07	67.80
2	18.80	91.67

FIGURE 11

TREND LINES FOR ACHIEVEMENT
(Instructor C)



INSTRUCTOR D

SUMMARY OF MEANS FOR ALL EFFECTS, CELL MEANS, AND CELL VARIANCES

Means For All Effects

A Main

1	2
138.10	140.34

B Main

1	2
139.91	138.52

C Main

1	2
135.01	143.43

A By B

	1	2
1	138.90	137.30
2	140.93	139.75

A By C

	1	2
1	134.30	141.90
2	135.71	144.96

B By C

	1	2
1	136.11	143.71
2	133.90	143.15

Cell Means (Block = C Levels)

	1	2
1	134.80	133.80
2	137.43	134.00

	1	2
1	143.00	140.80
2	144.43	145.50

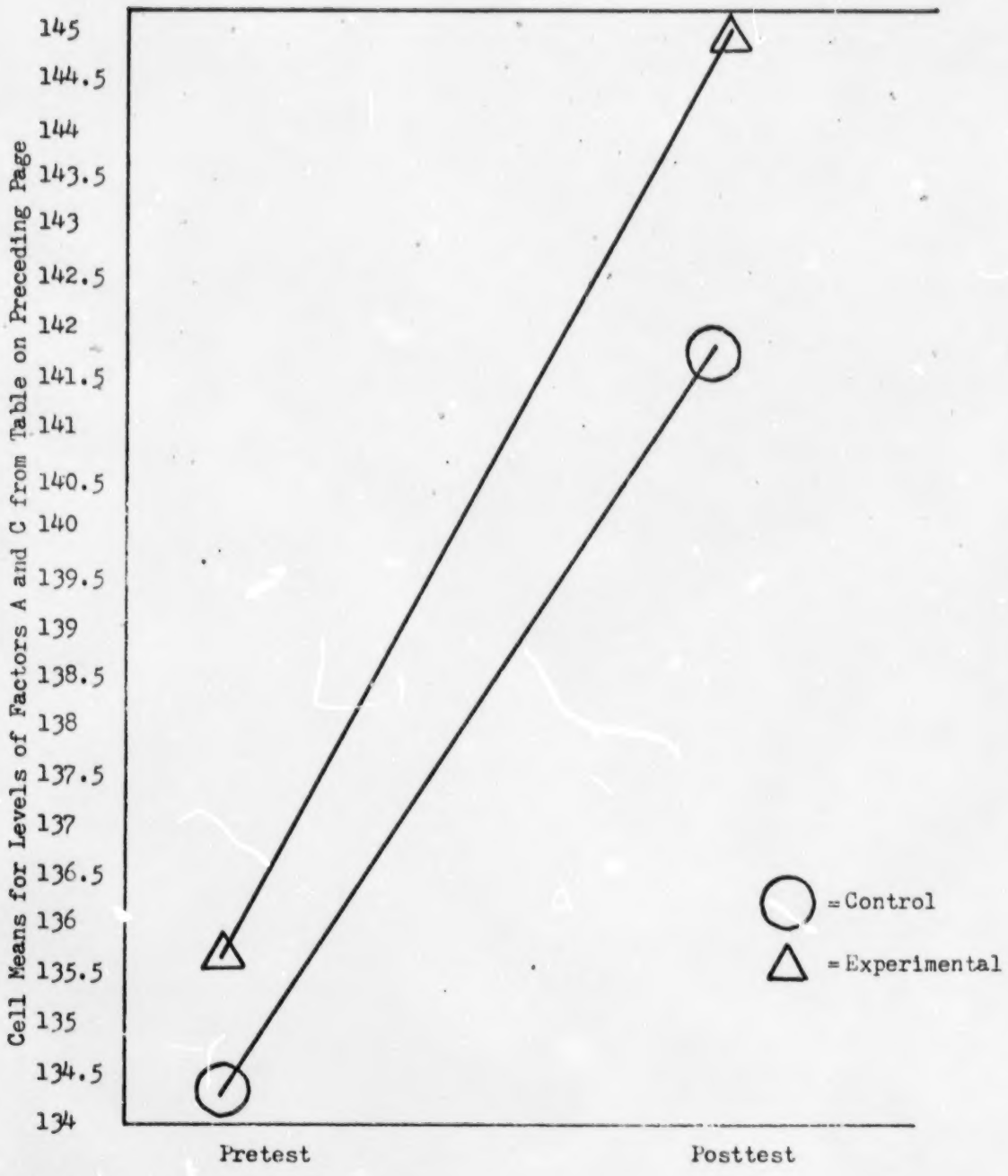
Cell Variances (Blocks = C Levels)

	1	2
1	137.20	85.83
2	36.95	104.00

	1	2
1	76.00	64.40
2	40.95	121.00

FIGURE 12

TREND LINES FOR ACHIEVEMENT
(Instructor D)



DATA ON INDIVIDUAL SUBJECTS
ALGEBRA CONTROL GROUP
INSTRUCTOR A
(FEMALE)

Student Number	Sex of Student	Grade	Active Participant	Pretest			Posttest		
				Raw Score Algebra I-A-I	Converted Score Algebra I-A	Group Rank Algebra I-A	Raw Score Algebra I-B	Converted Score Algebra I-B	Group Rank Algebra I-B
001	M	9	Con	18	144	5.5	20	149	13
002	M	10	Con	9	132	18.5	18	147	14 5
003	M	9	Con	12	136	13.5	21	151	10.5
004	M	9	Con	9	13[illegible]	18.5	17	145	17.5
005	M	9	Con	22	150	[illegible]	22	153	7
006	M	10	Con	10	134	16	12	139	20.5
007	M	9	Con	6	128	21	18	146	14.5
008	M	9	Con	11	134	16	27	159	3
009	M	9	Con	21	148	3	25	157	4.5
010	F	9	Con	17	144	5.5	21	151	10.5
011	F	9	Con	15	140	9	21	151	10.5
012	F	9	Con	13	138	11.5	17	145	17.5
013	F	9	Con	15	140	9	21	151	10.5
014	F	10	Con	11	134	16	12	139	20.5
015	F	10	Con	8	130	20	16	145	17.5
016	F	9	Con	26	156	1	32	167	1
017	F	9	Con	17	144	5.5	22	153	7
018	F	10	Con	12	136	13.5	17	145	17.5
019	F	9	Con	15	140	9	22	153	77
020	F	10	Con	17	144	5.5	30	163	2
021	F	10	Con	13	138	11.5	25	157	4.5

DATA ON INDIVIDUAL SUBJECTS--ALGEBRA
EXPERIMENTAL GROUP
INSTRUCTOR A
(FEMALE)

Student Number	Sex of Student	Grade	Active Participant	Pretest			Posttest		
				Raw Score Algebra I-A	Converted Score Algebra I-A	Group Rank Algebra I-B	Raw Score Algebra I-B	Converted Score Algebra I-B	Group Rank Algebra I-B
022	M	9	Yes	14	138	14	2[illegible]	153	11.5
023	M	10	Yes	15	140	11	25	157	9
024	M	10	Yes	16	142	8.5	25	157	9
025	M	10	Yes	10	134	17	28	161	5.5
026	M	9	Yes	15	140	11	31	165	3
027	M	9	Yes	16	142	8.5	28	161	5.5
028	M	9	Yes	18	144	6	20	149	14.5
029	M	10	Yes	19	132	9.5	16	145	18.5
030	M	9	NO	10	134	17	20	149	14.5
031	M	10	NO	18	144	6	20	149	14.5
032	F	9	NO	13	138	14	19	149	14.5
033	F	10	NO	10	134	17	17	145	18.5
034	F	10	NO	17	144	6	29	163	4
035	F	10	Yes	14	138	14	25	157	9
036	F	9	Yes	20	148	2	32	167	1.5
037	F	10	NO	9	132	19.5	17	145	18.5
038	F	9	NO	20	148	2	23	153	11.5
039	F	10	Yes	15	140	11	17	145	18.5
040	F	9	Yes	20	148	2	[illegible]2	167	1.5
041	F	9	Yes	19	146	4	26	159	7

DATA ON INDIVIDUAL SUBJECTS
ALGEBRA CONTROL GROUP
INSTRUCTOR B
(MALE)

Student Number	Sex of Student	Grade	Active Participant	Pretest			Posttest		
				Raw Score Algebra I-A	Converted Score Algebra I-A	Group Rank Algebra I-A	Raw Score Algebra I-B	Converted Score Algebra I-B	Group Rank Algebra I-B
042	M	9	Con	12	136	10	16	145	14
043	M	9	Con	14	138	5.5	16	145	14
044	M	10	Con	10	134	14	14	141	18
045	M	10	Con	13	138	5.5	24	155	1
046	M	10	Con	9	132	17	23	153	4
047	F	10	Con	11	134	14	23	153	4
048	F	9	Con	13	138	5.5	23	153	4
049	F	9	Con	15	140	2	19	149	9.5
050	F	9	Con	7	130	19	19	149	9.5
051	F	9	Con	12	136	10	13	141	18
052	F	9	Con	10	134	14	21	151	7.5
053	F	9	Con	13	138	5.5	18	147	11
054	F	10	Con	12	136	10	17	145	14
055	F	10	Con	11	134	14	11	137	20
056	F	10	Con	10	134	14	14	141	18
057	F	9	Con	7	130	19	22	153	4
058	F	9	Con	13	138	5.5		153	4
059	F	9	Con	13	138	5.5	16	145	14
060	F	10	Con	16	142	1	21	151	7.5

DATA ON INDIVIDUAL SUBJECTS--ALGEBRA
EXPERIMENTAL GROUP
INSTRUCTOR B
(MALE)

Student Number	Sex of Student	Grade	Active Participant	Pretest			Posttest		
				Raw Score Algebra I-A	Converted Score Algebra I-A	Group Rank Algebra I-A	Raw Score Algebra I-B	Converted Score Algebra I-B	Group Rank Algebra I-B
062	M	10	Yes	15	140	14	21	151	22.5
063	M	10	Yes	21	148	2.5	32	167	1
064	M	9	Yes	15	140	14	26	159	10.5
065	M	9	Yes	15	140	14	26	159	10.5
066	M	9	NO	9	132	26.5	31	165	2
067	M	10	Yes	25	154	1	27	159	10.5
068	M	9	NO	12	136	20.5	26	159	10.5
069	M	9	NO	18	144	5	23	153	20
070	M	9	Yes8	15	140	14	24	155	17
071	M	10	Yes	14	138	18	27	159	10.5
072	M	10	Yes	21	148	2.5	27	159	10.5
073	M	10	Yes	9	132	26.5	17	145	25.5
074	M	9	Yes	16	142	9	29	163	3.5
075	M	9	NO	15	140	14	29	163	3.5
076	F	10	Yes	11	134	23.5	24	155	17
077	F	10	NO	13	138	18	24	155	17
078	F	10	NO	16	142	9	22	153	20
079	F	9	Yes	16	142	9	18	147	24
080	F	9	NO	18	144	5	28	161	5
081	F	9	NO	16	142	9	26	159	10.5
082	F	9	Yes	13	138	18	21	151	22.5
083	F	9	Yes	10	134	23.5	17	145	25.5
084	F	9	Yes	11	134	23.5	22	153	20
085	F	10	NO	5	126	28	12	139	28
086	F	9	Yes	10	134	23.5	15	143	27
087	F	10	NO	12	136	20.5	26	159	10.5
088	F	9	Yes	17	144	5	27	159	10.5
089	F	10	NO	16	142	9	26	159	10.5

DATA ON INDIVIDUAL SUBJECTS
BIOLOGY CONTROL GROUP
INSTRUCTOR C
(MALE)

Student Number	Sex of Student	Grade	Active Participant	Pretest			Posttest		
				Raw Score Biology-A	Converted Score Biology-A	Group Rank Biology-A	Raw Score Biology-B	Converted Score Biology-B	Group Rank Biology-B
090	M	9	Con	29	142	5		139	14.5
091	M	9	Con	25	138	9.5	24	137	16.5
092	M	10	Con	33	146	3	28	141	11.5
093	M	10	Con	24	136	13	27	141	11.5
094	M	9	Con	25	138	9.5	26	139	14.5
095	M	9	Con	30	142	5	42	157	1
096	M	9	Con	20	132	19.5	27	141	11.5
097	M	10	Con	21	132	19.5	21	135	18.5
098	F	9	Con	26	138	9.5	32	145	6.5
099	F	9	Con	24	136	13	30	143	8.5
100	F	9	Con	37	152	1	40	155	2
101	F	10	Con	23	134	16.5	23	137	16.5
102	F	9	Con	26	138	9.5	35	149	4
103	F	10	Con	23	134	16.5	22	135	18.5
104	F	10	Con	19	130	21	14	127	22
105	F	9	Con	28	140	7	31	145	6.5
106	F	10	Con	22	134	16.5	18	131	20.5
107	F	9	Con	30	142	5	29	143	8.5
108	F	9	Con	24	136	13	37	151	3
109	F	9	Con	23	134	16.5	27	151	11.5
110	F	9	Con	34	148	2	33	147	5
111	F	10	Con	17	128	22	18	131	20.5

DATA ON INDIVIDUAL SUBJECTS--BIOLOGY
EXPERIMENTAL GROUP
INSTRUCTOR C
(MALE)

Student Number	Sex of Student	Grade	Active Participant	Pretest			Posttest		
				Raw Score Biology-A	Converted Score Biology-A	Group Rank Biology-A	Raw Score Biology-B	Converted Score Biology-B	Group Rank Biology-B
112	M	9	NO	22	134	15	32	145	10
113	M	9	NO	29	142	6.5	30	143	13
114	M	10	Yes	28	140	8.5	34	149	7.5
115	M	9	Yes	15	126	19.5	29	143	13
116	M	10	NO	15	126	19.5	24	137	17
117	F	10	NO	32	146	3	37	151	5
118	F	9	Yes	32	146	3	47	161	1.5
119	F	9	Yes	26	138	10.5	28	141	15
120	F	10	NO	19	130	18	23	137	17
121	F	9	Yes	30	142	6.5	36	151	5
122	F	9	Yes	31	144	5	32	145	10
123	F	9	Yes	24	136	13	22	135	19
124	F	10	NO	21	132	16.5	37	151	5
125	F	9	Yes	37	152	1	47	161	1.5
126	F	9	NO	12	122	21	19	131	20.5
127	F	10	Yes	21	132	16.5	19	131	20.5
128	F	10	Yes	25	138	10.5	41	155	3
129	F	9	NO	24	136	13	29	143	13
130	F	10	NO	24	136	13	23	137	17
131	F	9	Yes	28	140	8.5	31	145	10
132	F	9	NO	32	146	3	34	149	7.5

DATA ON INDIVIDUAL SUBJECTS
BIOLOGY CONTROL GROUP
INSTRUCTOR D
(MALE)

Student Number	Sex of Student	Grade	Active Participant	Pretest			Posttest		
				Raw Score Biology-A	Converted Score Biology-A	Group Rank Biology-A	Raw Score Biology-B	Converted Score Biology-B	Group Rank Biology-B
133	M	9	Con	10	120	14	23	137	11
134	M	10	Con	18	130	10.5	21	135	1 .5
135	M	10	Con	37	152	1	43	157	1
136	M	10	Con	23	134	9	32	145	5.5
137	M	10	Con	26	138	5.5	27	141	8
138	F	9	Con	15	126	12.5	17	129	14.5
139	F	9	Con	27	140	4	35	149	3.5
140	F	10	Con	24	136	7.5	32	145	5.5
141	F	9	Con	32	146	2	35	149	3.5
142	F	10	Con	19	130	10.5	26	139	9.5
143	F	10	Con	26	138	5.5	37	151	2
144	F	10	Con	31	144	3	26	139	9.5
145	F	10	Con	7	116	15	16	129	14.5
146	F	10	Con	24	136	7.5	22	135	12.5
147	F	9	Con	16	126	12.5	30	143	7

DATA ON INDIVIDUAL SUBJECTS--BIOLOGY
EXPERIMENTAL GROUP
INSTRUCTOR D
(MALE)

Student Number	Sex of Student	Grade	Active Participant	Pretest			Posttest		
				Raw Score Biology-A	Converted Score Biology-A	Group Rank Biology-A	Raw Score Biology-B	Converted Score Biology-B	Group Rank Biology-B
148	M	10	NO	27	140	3.5	26	139	9
149	M	10	Yes	32	146	2	35	149	4
150	M	10	NO	15	126	10	28	141	7.5
151	M	10	Yes	28	140	3.5	37	151	3
152	M	10	NO	24	136	6.5	24	137	10
153	M	10	Yes	24	136	6.5	28	141	7.5
154	M	9	NO	25	138	5	38	153	2
155	F	9	Yes	34	148	1	46	161	1
156	F	10	NO	19	130	9	29	143	5.5
157	F	9	Yes	13	124	11	21	135	11
158	F	9	NO	23	134	8	29	143	5.5

APPENDIX G

QUESTIONNAIRES AND RESPONSES

PARENT QUESTIONNAIRE

General Description of Subject Matter

1. What does your child understand on this homework assignment?

2. What presented problems to your child on this homework assignment?

3. Do you think that your child is ready for his/her test on this homework assignment based on your interaction with him/her.

4. What does your child need to do before taking the next test on this homework?

5. Please list comments not covered by the above questions which may allow the teacher to more effectively teach your child.

Parent or Guardian Signature

THANK YOU FOR YOUR INTEREST IN YOUR CHILD'S EDUCATION.

ACTIVE PARTICIPANT

STUDENT QUESTIONNAIRE AT COMPLETION OF STUDY

1. What were the things which you thought were meaningful regarding this study?

2. What were the things that you thought had no or little value regarding this study?

3. Did you show enthusiasm for this course which could be attributed to the method of producing interaction between student-parent-teacher?

☐ Yes ☐ Moderate ☐ No

4. List suggestions below as to how this method of producing parent-student-teacher involvement in academic areas could be improved?

5. If you would be interested in taking part in another program of this type please check one or both of the following boxes:

☐ With changes mentioned in question 4 above.

☐ Without changes mentioned in question 4 above.

6. On a scale of 1 to 10 (10=extremely effective, 1=extremely ineffective) give your perception of the effectiveness of this program by placing the number of your choice in the box below.

☐

THANK YOU FOR YOUR SINCERITY AND COOPERATION.

Sincerely

Jim Kinney
Researcher

SUMMARY OF RESPONSES FROM ACTIVE STUDENT QUESTIONNAIRES AT COMPLETION OF STUDY

Instructor A — 13 Active Participants

Question No.

1. Method teacher used in reviewing and explaining, helping parents, parent contact with subject matter.
2. Asking parents to help the student, the parent questionnaire.
3. 3 Yes — 5 Moderate — 5 No
4. More materials should be covered, more consistent, teachers should contact parents directly rather than through students.
5. 4 With changes — 6 Without changes
6. 4.8 Average response

Instructor B — 17 Active Participants

Question No.

1. Student progress, determines if parent really cares about their child's grades, keep parents informed, teacher awareness.
2. Did not like to take the two achievement tests, some meaningless questions on the questionnaire.
3. 5 Yes — 11 Moderate — 1 No
4. Working independently at own speed, achievement tests should be given at beginning, middle, and end, more participation.
5. 8 With changes — 6 Without changes
6. 4.8 Average response

Instructor C — 11 Active Participants

Question No.

1. Someone cared about our learning, someone watched course progression, study brought students and parents together.
2. All things were of value during this study, microscope parts.
3. 3 Yes — 6 Moderate — 2 No
4. Have parents come to some classes, have parent-teacher classes, program should last the year around, too low-scaled.
5. 4 With changes — 4 Without changes
6. 5.6 Average response

Instructor D — 5 Active Participants

Question No.

1. Helped develop good study habits, parents developed interest in the subject.
2. Questionnaires were given too often by instructor.
3. 2 Yes — 3 Moderate — 0 No
4. Instructor should give specific homework questions, questionnaire should be more specific, more variety.
5. 5 With changes — 0 Without changes
6. 6.6 Average response

ACTIVE PARTICIPANT
PARENT QUESTIONNAIRE AT COMPLETION OF STUDY

1. What were the things which you thought were meaningful regarding this study?

2. What were the things that you thought had no or little value regarding this study?

3. Did your child show enthusiasm for this course which could be attributed to the method of producing interaction between student-parent-teacher.

☐ Yes ☐ Moderate ☐ No

4. List suggestions below as to how this method of producing parent-student-teacher involvement in academic areas could be improved?

5. If you would be interested in taking part in another program of this type please check one or both of the following boxes:

☐ With changes mentioned in question 4 above.

☐ Without changes mentioned in question 4 above.

6. On a scale of 1 to 10 (10=extremely effective, 1=extremely ineffective) give your perception of the effectiveness of this program by placing the number of your choice in the box below.

☐

THANK YOU FOR YOUR SINCERITY AND COOPERATION.

Sincerely

Jim Kinney
Researcher

SUMMARY OF RESPONSES FROM ACTIVE PARENT QUESTIONNAIRES AT COMPLETION OF STUDY

Instructor A — 13 Active Participants

Question No.

1. More understanding between parent and student, create more interest, teacher took more interest in explaining subject.
2. Lack of algebra knowledge by parent keeps parent from accurately analyzing student homework.
3. 8 Yes 4 Moderate 1 No
4. Should be used in advanced subjects, there should be more of these programs, more stimulation for cooperation.
5. 5 With changes 8 Without changes
6. 7 Average response

Instructor B — 17 Active Participants

Question No.

1. Difficulties brought to light, follow progress every week rather than every grading period, encouraged review.
2. Reporting difficulties on homework had no effect on child classroom help, parents inability to help.
3. 4 Yes 9 Moderate 4 No
4. Teacher should be more aware of individual needs, teacher needs a study hall period, greater questionnaire variety.
5. 3 With changes 12 Without changes
6. 7 Average response

Instructor C — 11 Active Participants

Question No.

1. Makes students think through issues or problems, interaction helps translate theories to real life situations.
2. All things were of value during this study.
3. 3 Yes 6 Moderate 2 No
4. Greater variety on the questionnaire.
5. 6 With changes 5 Without changes
6. 5.7 Average response

Instructor D — 5 Active Participants

Question No.

1. Opportunity to learn, students initiated interaction, increased communication between parents and students.
2. Infrequency of questionnaires
3. 2 Yes 3 Moderate 0 No
4. Changes and variety on the questionnaires, more questionnaires on the lessons, this study is a good idea.
5. 5 With changes 0 Without changes
6. 6 Average response

INSTRUCTOR QUESTIONNAIRE AT COMPLETION OF STUDY

1. What were the things which you thought were meaningful regarding this study?

2. What were the things that you thought had no or little value regarding this study?

3. Did active participants show enthusiasm for this course which could be attributed to the method of producing interaction between student-parent-teacher?

☐ Yes ☐ Moderate ☐ No

4. Did non-participants show enthusiasm for this course which could be attributed to the method of producing interaction used by the active participants?

☐ Yes ☐ Moderate ☐ No

5. List suggestions below as to how this method of producing parent-student-teacher involvement in academic areas could be improved?

6. If you would be interested in using this method of instruction please check one or both of the following boxes:

☐ With changes mentioned in question 5 above.

☐ Without changes mentioned in question 5 above.

7. On a scale of 1 to 10 (10=extremely effective, 1=extremely ineffective) give your perception of the effectiveness of this program by placing the number of your choice in the box below.

☐

THANK YOU FOR YOUR SINCERITY AND COOPERATION.

Sincerely

Jim Kinney
Researcher

SUMMARY OF RESPONSES FROM INSTRUCTOR QUESTIONNAIRES AT COMPLETION OF STUDY

Instructor A Age 42 Sex F Yrs. Exp. 4

1 Interaction between student and parent.
2 Everything was of significant value, it was a problem implementing the ideas since I was new to the school system.
3 ___Yes ___x___Moderate _____No
4 ___Yes _____Moderate ___x___No
5 Verbal contact with parents should be made after the first couple of weeks since questionnaires got harder to get back.
6 ___x___With changes _____Without changes
7 ___7___Average response

Instructor B Age 34 Sex M Yrs. Exp. 11

1 The interaction between the home and the school.
2 All things were of value during this study.
3 _____Yes ___x___Moderate _____No
4 _____Yes _____Moderate ___x___No
5 Making it mandatory that all students participate.
6 _____With changes _____Without changes
7 ___8___Average response

Instructor C Age 38 Sex M Yrs. Exp. 13

1 Interaction, questionnaire was an excellent feedback mechanism.
2 All things were of value during this study.
3 _____Yes ___x___Moderate _____No
4 _____Yes ___x___Moderate _____No
5 Students should be counseled to be more open-minded regarding the questionnaire as an educational tool, students were timid.
6 ___x___With changes _____Without changes
7 ___8___Average response

Instructor D Age 35 Sex M Yrs. Exp. 9

1 Discussing concepts with someone else is an excellent way to learn.
2 All things were of value during this study.
3 ___x___Yes _____Moderate _____No
4 _____Yes ___x___Moderate _____No
5 Parents should be contacted verbally regarding the intent of the study.
6 _____With changes _____Without changes
7 ___7___Average response

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